

EXHIBIT 11



Final

Record of Decision for Parcel E-2

**Hunters Point Naval Shipyard
San Francisco, California**

November 2012

Prepared by:

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Prepared under:

**Naval Facilities Engineering Command
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Acronyms and Abbreviations

ARARs	applicable or relevant and appropriate requirements
ARIC	area requiring institutional controls
bgs	below ground surface
BRAC	Base Realignment and Closure
Cal. Code Regs.	California Code of Regulations
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
⁶⁰ Co	cobalt-60
COCs	chemicals of concern
COECs	chemicals of ecological concern
COPEC	chemical of potential ecological concern
¹³⁷ Cs	cesium-137
CSM	conceptual site model
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
HHRA	human health risk assessment
HI	hazard index
HPNS	Hunters Point Naval Shipyard
IR	Installation Restoration
LUC RD	land use control remedial design
MOA	Memorandum of Agreement
MPE	maximum probable earthquake
msl	mean sea level
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NMOCs	non-methane organic compounds

Acronyms and Abbreviations *(continued)*

NPL	National Priorities List
NRDL	Naval Radiological Defense Laboratory
OMP	operation and maintenance plan
pCi/g	picocuries per gram
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
ppmv	parts per million by volume
PSCs	protective soil concentrations
²²⁶ Ra	radium-226
RAOs	remedial action objectives
RD	remedial design
RI	Remedial Investigation
RME	reasonable maximum exposure
RMP	risk management plan
ROC	radionuclide of concern
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SLERA	screening-level ecological risk assessment
⁹⁰ Sr	strontium-90
SVOCs	semivolatile organic compounds
TCRA	time-critical removal action
tit.	title
TPH	total petroleum hydrocarbons
UCSF	University of California at San Francisco
VOCs	volatile organic compounds
Water Board	San Francisco Bay Regional Water Quality Control Board
µg/L	micrograms per liter
§	Section
95 UCL activity level	95th percent upper confidence limit of the mean activity level

Section 1. Declaration

This Record of Decision (ROD) presents the selected remedy for Parcel E-2 at Hunters Point Naval Shipyard (HPNS) in San Francisco, California. HPNS was placed on the National Priorities List (NPL) in 1989 (U.S. Environmental Protection Agency [EPA] ID: CA71170090087). The remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 (Title 42 United States Code Section (§) 9601, et seq.); and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 Code of Federal Regulations Part 300). This decision is based on the Administrative Record file for this site¹. The Administrative Record Index is included in the electronic version of the ROD as [Attachment 1](#). The Department of the Navy (Navy) and EPA jointly selected the remedy for Parcel E-2. The California Department of Toxic Substances Control (DTSC) and the San Francisco Bay Regional Water Quality Control Board (Water Board) concur on the remedy for Parcel E-2. The Navy provides funding for site cleanups at HPNS. The Federal Facility Agreement (FFA) for HPNS documents how the Navy intends to meet and implement CERCLA in partnership with EPA, DTSC, and the Water Board.

Parcel E is one of six parcels (Parcels A through F) originally designated for environmental restoration. In September 2004, the Navy divided Parcel E into two parcels (Parcels E and E-2) to facilitate closure of the Parcel E-2 Landfill and its adjacent areas². Long-term use in Parcel E-2 consists of open space. Environmental investigations began at Parcel E, including Parcel E-2, in 1984. The Final Remedial Investigation (RI)/Feasibility Study (FS) Report was completed and submitted in 2011. This ROD documents the final remedial action for Parcel E-2 and does not include or affect any other sites at HPNS.

1.1. SELECTED REMEDY

The CERCLA remedial action selected in this ROD is necessary to protect the public health, welfare, or the environment from actual or potential releases of hazardous substances from Parcel E-2. The selected remedy for Parcel E-2 addresses the following contaminated media:

¹ **Bold blue text** identifies detailed site information available in the Administrative Record and listed in the References Table ([Attachment 2](#)). This ROD is also available on CD, whereby bold blue text serves as a hyperlink to reference information. The excerpts referenced by the hyperlinks are part of the ROD. The hyperlink will open a text box at the top of the screen. A blue box surrounds applicable information in the hyperlink. To the extent inconsistencies may exist between the referenced information attached to the ROD via hyperlinks and the information in the basic ROD itself, the language in the basic ROD controls.

² Discussions within this ROD (as well as the RI/FS Report and its radiological addendum) that reference documents published prior to September 2004 refer to the portion of Parcel E that became Parcel E-2.

- **Soil** – metals (antimony, arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel, vanadium, and zinc), radionuclides (cesium-137 [^{137}Cs], cobalt-60 [^{60}Co], radium-226 [^{226}Ra], and strontium-90 [^{90}Sr]), pesticides, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and dioxins
- **Shoreline sediment** – metals (antimony, copper, lead, mercury, nickel, and zinc), radionuclides (^{226}Ra , ^{137}Cs , and ^{90}Sr), pesticides, and PCBs
- **Landfill gas** – methane and volatile organic compounds (VOCs)
- **Groundwater** – metals (arsenic, chromium VI, iron, lead, and thallium), radionuclides (^{226}Ra , ^{137}Cs , and ^{90}Sr), pesticides, PCBs, SVOCs, TPH, VOCs, and anions (such as ammonia and cyanide)

The selected remedy consists of the following actions to address risks posed by contaminated media:

- Remove and dispose of contaminated soil in selected areas that contain high concentrations of non-radioactive chemicals, and separate and dispose of materials and soil with radiological contamination found in these areas
- Perform radiological surveys throughout Parcel E-2 and separate and dispose of materials and soil with radiological contamination found during the surveys
- Install a soil cover over all of Parcel E-2, with a protective liner (consisting of a geomembrane with an overlying geocomposite drainage layer) where needed to minimize water seeping into the contaminated material
- Install below-ground barriers to limit groundwater flow from the landfill to San Francisco Bay, including a contingency action to hydraulically control groundwater (behind the barrier) if necessary to satisfy pertinent applicable or relevant and appropriate requirements (ARARs) (see [Section 2.9.4](#))
- Remove and treat landfill gas to prevent it from moving beyond the Parcel E-2 boundary
- Build a shoreline revetment
- Monitor and maintain the different parts of the selected remedy to ensure they are working properly
- Use institutional controls to restrict specific land uses and activities on Parcel E-2

1.2. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state statutes and regulations that are applicable or relevant and appropriate to the remedy, and is cost-effective. The selected remedy uses permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. It provides the best balance of tradeoffs relative to the

five balancing criteria and properly considers the two modifying criteria³. The selected remedy does not satisfy the statutory preference for treatment⁴ as a principal element because there is no cost-effective means of treating the large quantity of low-level soil contamination throughout Parcel E-2 and the small quantities of principal threat wastes at the PCB Hot Spot Area cannot be treated in a cost-effective manner. However, the principal threat wastes at the PCB Hot Spot Area are being excavated under a removal action that is scheduled to be completed in 2012. In addition, the protective liner and below-ground barriers are expected to reduce the mobility of contamination and natural attenuation mechanisms will reduce the toxicity, mobility, and volume of some contaminants. Statutory five-year reviews pursuant to CERCLA § 121 and the NCP will be conducted because the remedy will leave contamination in place at Parcel E-2 above concentrations that allow for unlimited use and unrestricted exposure.

1.3. DATA CERTIFICATION CHECKLIST

The following information is included in [Section 2](#) of this ROD. Additional information can be found in the Administrative Record file for this site:

- Chemicals of concern (COC) and chemicals of ecological concern (COECs) and their concentrations ([Sections 2.3 and 2.5](#)).
- Baseline risk represented by COCs and COECs ([Section 2.5](#)).
- Remediation goals established for COCs and COECs and the basis for these goals ([Sections 2.5 and 2.7](#)).
- Principal threat wastes ([Section 2.6](#)).
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater ([Section 2.4](#)).
- Potential land and groundwater use that will be available at Parcel E-2 as a result of the selected remedy ([Section 2.9.3](#)).
- Estimated capital costs, annual operation and maintenance, and total present worth costs; discount rate; and the number of years over which the remedy cost estimate is projected ([Section 2.8](#)).
- Key factors that led to selecting the remedy (e.g., a description of how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) ([Section 2.9.1](#)).

³ As defined in the NCP (Title 40 Code of Federal Regulations § 300.430[f][1][i]), the five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. State and community acceptance are modifying criteria that shall be considered in remedy selection.

⁴ As defined in the NCP (Title 40 Code of Federal Regulations § 300.5), "treatment technology" means any unit operation or series of unit operations that alters the composition of a hazardous substance or pollutant or contaminant through chemical, biological, or physical means so as to reduce toxicity, mobility, or volume of the contaminated materials being treated. Treatment technologies are an alternative to land disposal of hazardous wastes without treatment.

1.4. AUTHORIZING SIGNATURES

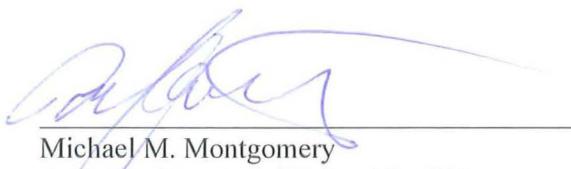
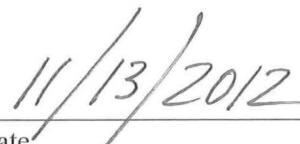
This signature sheet documents the Navy's and EPA's co-selection of the remedy in this ROD. This signature sheet also documents the State of California's (DTSC and Water Board) concurrence with this ROD.



Keith S. Forman

Base Realignment and Closure Environmental Coordinator
Base Realignment and Closure Program Management Office West
Department of the Navy

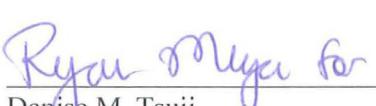
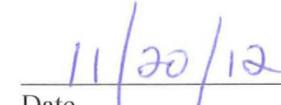
Date



Michael M. Montgomery

Assistant Director of Federal Facilities
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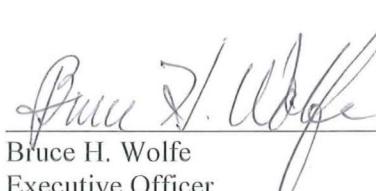
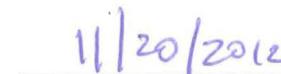
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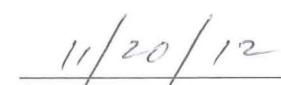
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Bruce H. Wolfe

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San Francisco Regional Water Quality Control Board

Date



Section 2. Decision Summary

2.1. SITE DESCRIPTION AND HISTORY

HPNS is located in southeastern San Francisco on a peninsula that extends east into San Francisco Bay (see [Figure 1](#)). HPNS consists of 866 acres: 420 acres on land and 446 acres under water in the San Francisco Bay. In 1940, the Navy obtained ownership of HPNS for shipbuilding, repair, and maintenance activities. After World War II, activities at HPNS shifted to submarine maintenance and repair. HPNS was also the site of the Naval Radiological Defense Laboratory (NRDL). A history of Navy radiological operations at HPNS is provided in Volume II of the Historical Radiological Assessment (HRA), and radiological operations at Parcel E-2 are summarized in [Section 2.2](#).

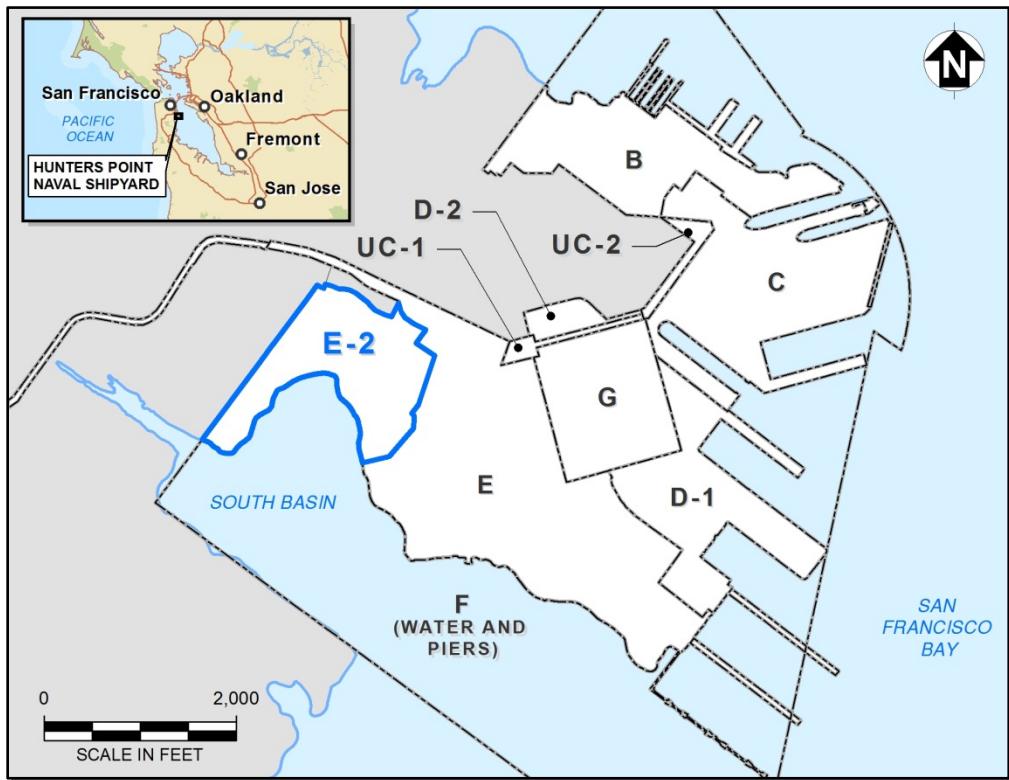


Figure 1. Facility and Parcel E-2 Location Map

HPNS was deactivated in 1974 and remained relatively unused until 1976. Between 1976 and 1986, the Navy leased most of HPNS to Triple A Machine Shop, Inc., a private ship repair company. In 1987, the Navy resumed occupancy of HPNS. Because past shipyard operations left hazardous substances on site, HPNS property was placed on the NPL in 1989 pursuant to CERCLA, as amended by the SARA. In 1991, HPNS was designated for closure pursuant to the Defense Base Closure and Realignment Act of

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1990. Closure activities at HPNS involve conducting environmental remediation and making the property available for nondefense use.

Parcel E-2₍₁₎, which includes about 47 acres of shoreline and lowland coast along the southwestern portion of the shipyard (see [Figure 1](#)), consists of four distinct study areas that were designated to organize the information presented in the RI/FS Report (see [Figure 2](#)):

- The Parcel E-2 Landfill, located in the north-central part of Parcel E-2
- The Panhandle Area, located west and southwest of the Parcel E-2 Landfill
- The East Adjacent Area, located to the east of the Parcel E-2 Landfill
- The Shoreline Area, located at the edge of San Francisco Bay

A small portion of the Parcel E-2 Landfill extends north onto property owned by the University of California at San Francisco (UCSF) (see [Figure 2](#)).

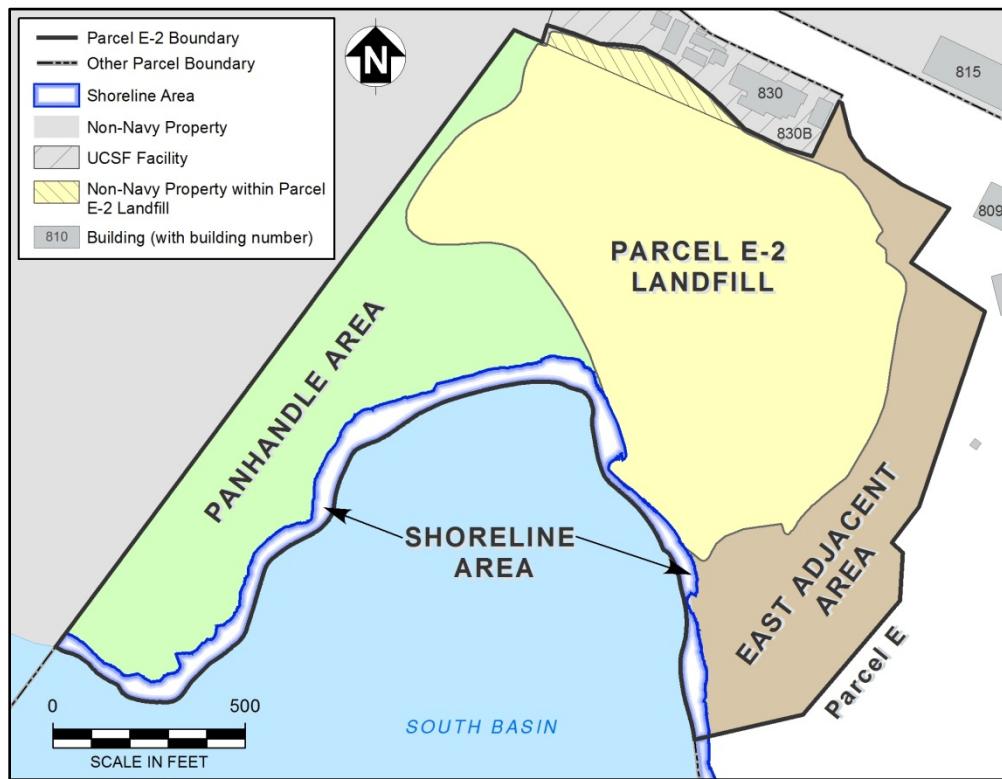


Figure 2. Parcel E-2 Areas

2.2. SITE CHARACTERISTICS

Parcel E-2 was created by filling in the bay margin with various materials, including native soil, rock, and sediments, as well as construction and industrial debris. The ground surface elevation at Parcel E-2 varies from approximately 30 feet above mean sea level (msl) in the northern portion of the parcel to a few feet above msl along the southwestern portion of the parcel. The **Parcel E-2 Landfill₍₂₎** is a 22-acre area

where the Navy disposed of various shipyard wastes from the mid-1950s to the early-1970s. These wastes include:

- Construction debris (including wood, steel, concrete, and soil)
- Municipal-type trash (including paper, plastic, and metal)
- Industrial waste (including sandblast waste, paint sludge, solvents, and PCB-containing waste oils)

The Navy's investigations showed that the landfill waste consists of mostly construction debris and trash, with smaller amounts of industrial waste. After the 22-acre landfill closed in the early 1970s, the Navy covered it with 2 to 5 feet of soil at that time. As detailed in [Section 2.3](#), the Navy has since performed several removal actions at Parcel E-2 to minimize potential exposure to hazardous chemicals. These actions included [construction of an additional interim landfill cap](#)⁽³⁾ over 14.5 acres of the landfill that was burned during an August 2000 brush fire at the Parcel E-2 Landfill. The interim landfill cap was constructed to inhibit oxygen migration into the waste to prevent more fires from occurring under the capped area. The total volume of soil cover over the 22-acre landfill at the date of signature of this ROD is estimated to be 393,500 cubic yards, and the volume of landfill waste is estimated to be 473,000 cubic yards.

[Fill materials in the East Adjacent, Panhandle, and Shoreline Areas of Parcel E-2](#)⁽⁴⁾ are distinct from the Parcel E-2 Landfill. Specifically, fill materials in the East Adjacent, Panhandle, and Shoreline Areas consist primarily of soil, sediment, and rock with isolated solid waste locations that are not contiguous with solid waste in the Parcel E-2 Landfill. The characteristics of the East Adjacent, Panhandle, and Shoreline Areas are described below.

- The East Adjacent Area was created by filling in San Francisco Bay prior to the 1950s with soil and construction debris. Some industrial waste was disposed of in parts of the East Adjacent Area, including an area referred to as the PCB Hot Spot Area. The PCB Hot Spot Area was partially addressed under an early removal action (see [Section 2.3](#)).
- The Panhandle Area was created by filling in San Francisco Bay in the 1950s with soil and construction debris. The Navy disposed of metal slag in a part of the Panhandle Area referred to as the Metal Slag Area. The Metal Slag Area was partially addressed under an early removal action (see [Section 2.3](#)). Also, the Navy tested ship-shielding technologies in another part of the Panhandle Area referred to as the Ship-Shielding Area.
- The Shoreline Area is adjacent to San Francisco Bay and contains contaminated sediments. Contaminated sediments above msl will be addressed by the selected remedy for Parcel E-2. Contaminated sediments below msl will be addressed by the selected remedy for Parcel F, the Navy's property offshore of HPNS.

The HRA identified [areas where low-level radiological material may be located](#)⁽⁵⁾ at Parcel E-2. These areas are shown on [Figure 3](#).

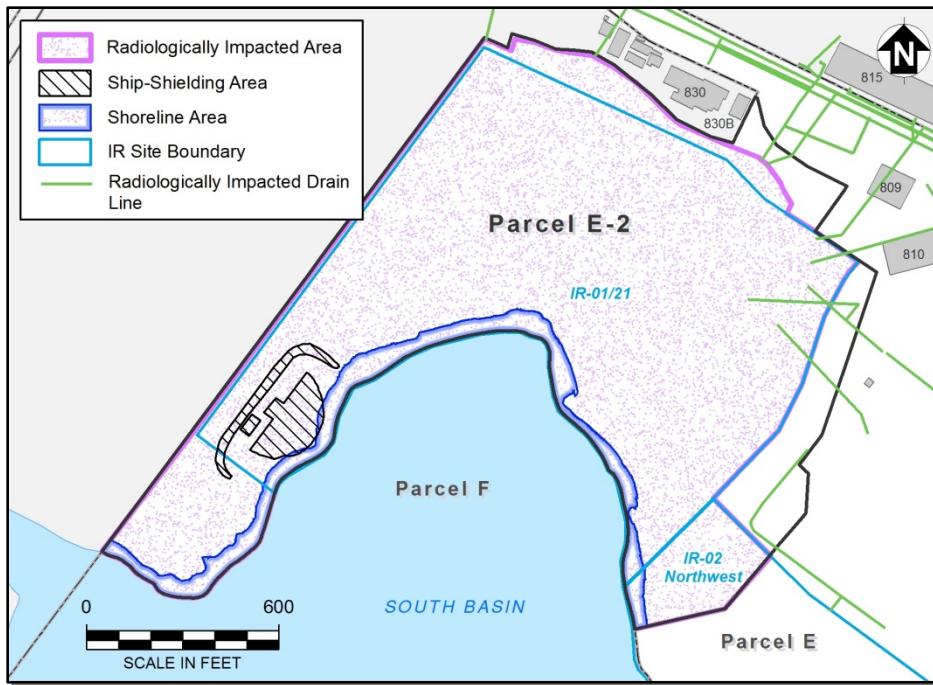


Figure 3. Radiologically Impacted Areas

The following **radiological operations**⁽⁶⁾ were identified at Parcel E-2:

- Dials, gauges, and deck markers painted with radioactive paint (containing low levels of ^{226}Ra) were disposed of at the Parcel E-2 Landfill and portions of the Panhandle Area and the East Adjacent Area (located within Installation Restoration [IR] Sites 01/21 and 02).
- Industrial debris and metal slag with dials, gauges, and deck markers painted with radioactive paint were disposed of at the Metal Slag Area (removed during a previous removal action).
- Small amounts of low-level radionuclides may be present in drain lines in the eastern part of Parcel E-2. Potential releases of low-level radionuclides into drain lines at former NRDL buildings located outside of Parcel E-2 (in Parcel E) may have led to drain lines in the eastern part of Parcel E-2. The drain lines in Parcel E and any contamination in them are currently being excavated as part of an ongoing removal action being performed throughout HPNS.
- Materials used during radiological experiments by NRDL may have been disposed of at the Parcel E-2 Landfill and portions of the Panhandle Area and the East Adjacent Area (located within IR Sites 01/21 and 02). However, historical records presented in the HRA suggest that such material was strictly controlled, particularly after 1954 when the U.S. Atomic Energy Commission began regulating the use of radionuclides at HPNS. This information indicates that the volume of NRDL waste potentially disposed of in and around the Parcel E-2 Landfill was relatively low because most of these areas were filled after 1955.

- Sandblast waste from cleaning ships used during weapons testing in the South Pacific may have been disposed of at the Parcel E-2 Landfill, the Panhandle Area, and portions of the East Adjacent Area (located within IR Sites 01/21 and 02). However, historical records presented in the HRA indicate that waste with the highest levels of radioactivity was controlled and not disposed of anywhere at HPNS, including Parcel E-2.

The [hydrostratigraphy](#)⁽⁷⁾ of Parcel E-2 consists of four distinct units: the shallow A-aquifer, several aquitard zones, the deeper B-aquifer, and underlying bedrock water-bearing zone. An aquitard zone separates the A- and B-aquifer across most of Parcel E-2, except in the northwest corner. The presence of additional aquitard zones within the B-aquifer sediments isolate the uppermost portions of the B-aquifer (that are interconnected with the A-aquifer) from the lower portions of the B-aquifer. Groundwater is not currently used for any purpose at Parcel E-2. Groundwater in the A-aquifer is not suitable as a potential source of [drinking water](#)⁽⁸⁾. Based on an evaluation of site-specific conditions relative to pertinent regulatory criteria, groundwater in the B-aquifer has a moderate potential to be used as a future source of drinking water.

[Groundwater flow patterns](#)⁽⁹⁾ at Parcel E-2 are complex because they are potentially affected by (1) a groundwater sink located in adjacent Parcel E; (2) leaks of groundwater into former sanitary sewers or storm drains; (3) recharge from water supply lines; and (4) tides in San Francisco Bay. Most groundwater at Parcel E-2 flows toward San Francisco Bay. In the northeastern portion of Parcel E-2, however, groundwater has historically flowed toward the groundwater sink in Parcel E, where groundwater elevations are below msl. The sink was likely caused by leaks of groundwater into sanitary sewer lines, which were then pumped to the off-site, publicly owned treatment works, thereby lowering groundwater levels in the area. Flow patterns continue to change now that pumping has been discontinued and as sewer and storm drain lines are removed throughout Parcel E and other HPNS parcels. Sewer and storm drain lines remain in the northern and eastern portions of Parcel E-2 ([Figure 4](#)).

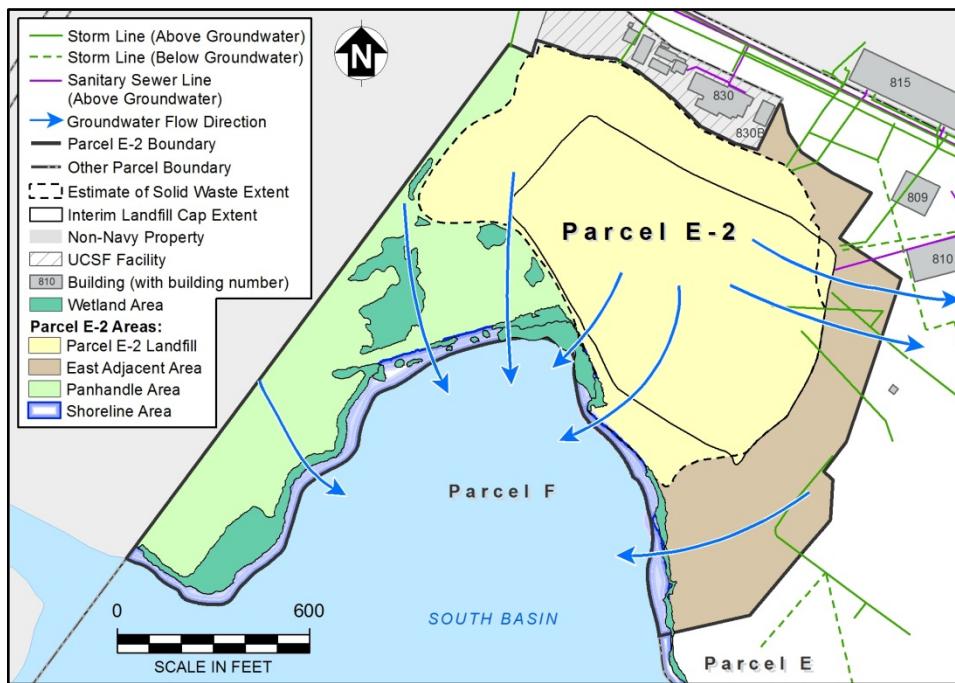


Figure 4. Parcel E-2 Existing Site Features

Parcel E-2 ecology⁽¹⁰⁾ includes terrestrial habitat, aquatic environments, and transitional wetlands. All of these ecological areas have been disturbed by human activities such as excavation, filling, and development, and support relatively few plant species. Birds, mammals, and reptiles have been observed in this parcel. No threatened or endangered species are known to inhabit Parcel E-2 or its immediate vicinity. Wetlands are located in the Panhandle Area and Shoreline Area ([Figure 4](#)). The existing wetlands provide habitat for wintering and migrating wildlife; however, their value in terms of social significance, effectiveness, and opportunity is low because the wetlands are located on manmade land that has been disturbed by human activities and contains chemical contamination.

2.3. PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS

Parcel E-2 was one of the first environmental investigation sites identified at HPNS during the Initial Assessment Study conducted by the Navy (1984), and the Navy has performed numerous **environmental investigations**⁽¹¹⁾ at Parcel E-2 since then. The Navy has collected extensive information during these investigations, as well as during ongoing environmental monitoring programs for groundwater and landfill gas, including:

- Over 2,000 soil samples and over 800 groundwater samples analyzed for various radionuclides and nonradioactive chemicals to determine the types and concentrations of chemicals
- Over 30 trenches and over 200 soil borings to identify the types of waste disposed of at Parcel E-2
- Over 3,000 soil gas and outdoor air samples analyzed for methane and other organic chemicals to track emissions from the landfill
- Special investigations to address the unique site conditions at Parcel E-2 that included identifying buried waste using special geophysical instruments, evaluating liquefaction potential, identifying existing wetlands, and analyzing shoreline sediment for various chemicals

[Figures 5 and 6](#) shows the locations where samples were collected to analyze groundwater, soil, and landfill gas during the numerous site investigations. The RI/FS Report (May 5, 2011) and radiological addendum (March 4, 2011) summarize the results of the environmental investigations at Parcel E-2 and document how much is known about the site. The previous investigations provide sufficient information to evaluate site risks, develop remedial alternatives, and support the remedy decision made in this ROD.

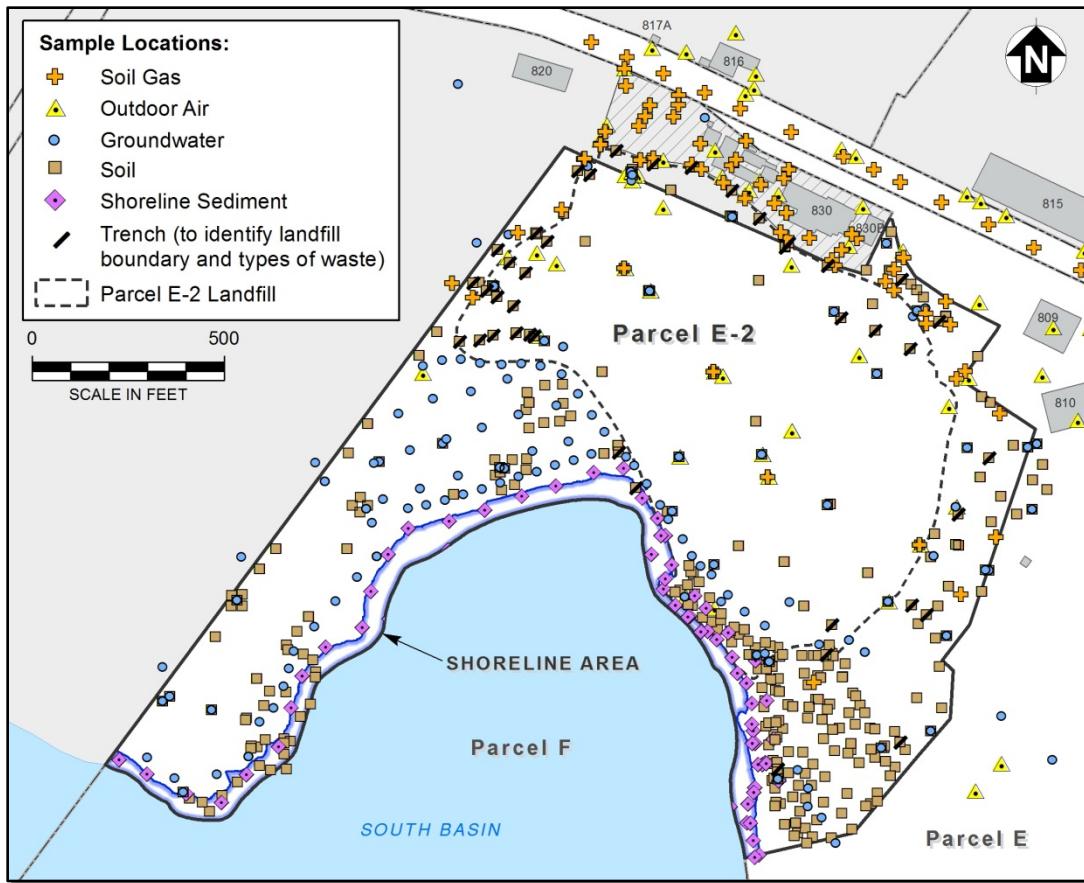


Figure 5. Previous Sampling Locations for Nonradioactive Chemicals

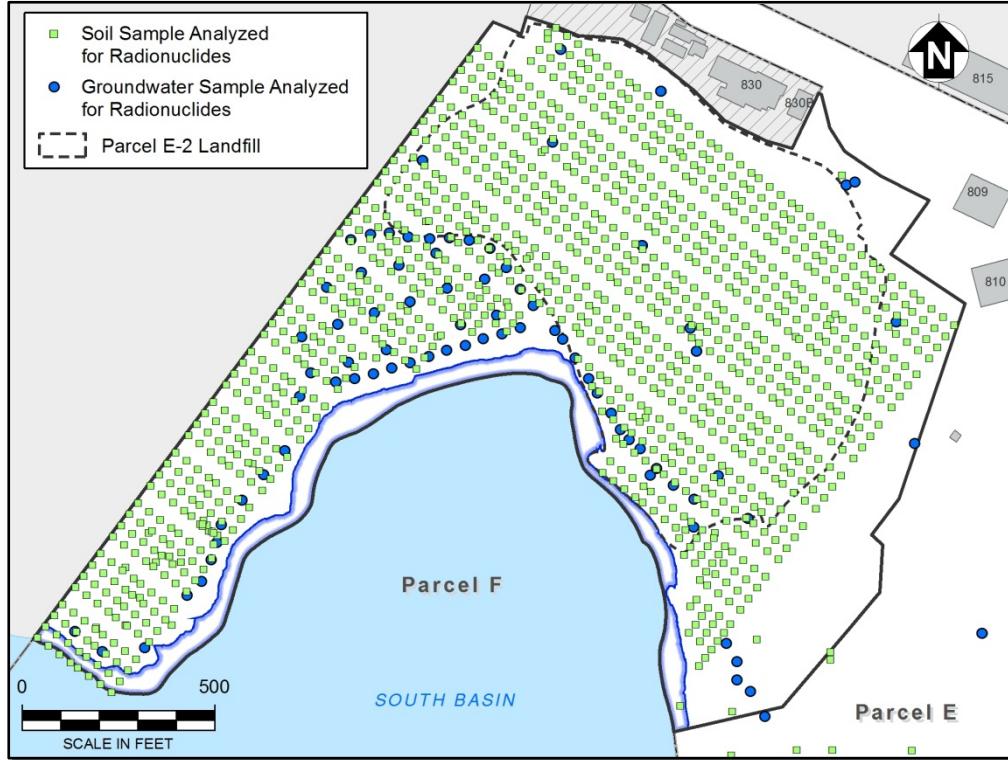


Figure 6. Previous Sampling Locations for Radionuclides

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The Navy has also performed several removal actions at Parcel E-2 (Figure 7) to minimize potential exposure to hazardous chemicals. The previous excavations (as shown on Figure 7) successfully removed significant amounts of contamination from certain areas of Parcel E-2; however, contamination remains elsewhere at Parcel E-2, and the Navy initiated two additional time-critical removal actions (TCRAs) (at the PCB Hot Spot Area and the Ship-Shielding Area) to promptly address this contamination prior to the ROD. However, because the TCRAs are not complete at the date of ROD signature, the excavations will be completed as a remedial action pursuant to this ROD. Table 1 summarizes the previous studies, investigations, and removal actions conducted at Parcel E-2; Table 1 also describes the two ongoing TCRAs at the PCB Hot Spot Area and the Ship-Shielding Area.

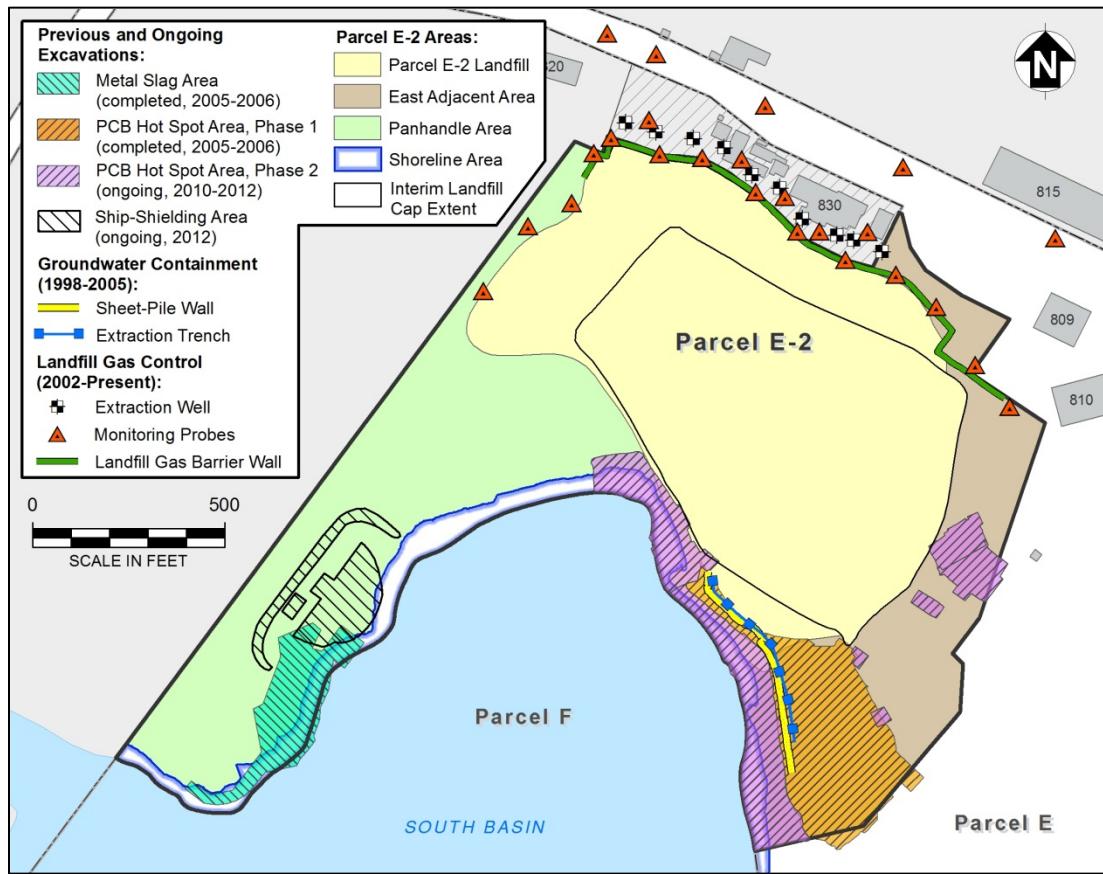


Figure 7. Removal Actions

Table 1. Previous Investigations and Removal Actions

Previous Investigation/ Removal Action ^a	Date(s)	Investigation/Removal Action Activities
Initial Assessment Survey	1984	Records reviews and a visual inspection of the landfill (IAS Site 3, later renamed IR Site 01/21) were conducted. The IAS concluded it was highly probable that chemicals from waste disposed of in the Parcel E-2 Landfill had reached groundwater and were migrating toward San Francisco Bay.
Confirmation Study/ Verification Step	1987	A geophysical survey, subsurface exploration using exploratory borings, and soil and groundwater sampling were conducted in the area of the landfill. The study concluded that soil at the Parcel E-2 Landfill contained various VOCs and SVOCs that were associated with petroleum products and some chlorinated organic solvents.
Area Study	1987	The study was conducted throughout HPNS to evaluate whether a release of hazardous substances to soil had occurred at construction sites outside the boundaries of previously identified investigation sites. The area study primarily concluded that soil within Study Area A, including Parcels E and E-2, contained naturally occurring asbestos derived from serpentine bedrock
Solid Waste Air Quality Assessment Test	1988	The study included evaluation of meteorological conditions, ambient air quality, landfill gas compositions, surface gas emissions, and subsurface gas migration. Methane was detected in isolated pockets at IR Site 01/21 and at the northern edge of the IR Site 01/21 boundary (near the UCSF compound, but within the solid waste footprint).
OU-I RI	1988 – 1992	The Parcel E-2 Landfill progressed to the RI stage as IR Site 01/21 and was grouped (along with IR Sites 02 and 03 in Parcel E) into OU-I. The first phase of the OU-I RI (from 1988 to 1989) included a geophysical survey and test pit excavation to delineate the extent of landfill waste, a soil gas survey to evaluate the presence of VOCs in soil and groundwater, and installation of deep soil borings to define subsurface stratigraphy. Subsequent investigation phases involved sampling of soil and groundwater (performed from 1990 to 1992).
Radiological Investigations (Phases I and II)	1991 and 1993	During the Phase I investigation, nine radioactive point source anomalies associated with radium-containing devices were observed near the ground surface in the southwestern portion of Parcel E-2. During the Phase II investigation, trenches were excavated near these areas but no elevated gamma count rates were measured.
Parcel E RI/FS	1995 to 1998	The RI at the landfill was completed in conjunction with other Parcel E IR sites, and involved additional field investigation performed from October 1995 to June 1996. The Parcel E RI also included a baseline ERA and HHRA.
Groundwater Extraction System and Containment Barrier	1997 to 1998	A vertical sheet-pile wall and groundwater extraction system were installed at the southeast portion of Parcel E-2 to control contaminated groundwater next to San Francisco Bay. The sheet-pile wall, which remains in place, consists of interlocking steel panels and limits the flow of groundwater to the bay. The extraction system consisted of horizontal and vertical pipes and groundwater pumps, and removed contaminated groundwater that was transported to the off-site, publicly owned treatment works. The Navy operated the extraction system until 2005, when it was removed so that the contaminant source (i.e., the PCB Hot Spot Area) could be excavated and disposed of at one or more approved off-site landfills. During its 6 years of operation, extracted groundwater was tested for chemical contaminants and found to meet the City and County of San Francisco's requirements for direct discharge to the sewer system.
Interim Landfill Cap Construction	2000 to 2001	A protective liner and soil cover were installed over part of the landfill (about 14.5 acres) to stop smoldering below ground following a brush fire. The fire started on August 16, 2000, and was extinguished at the surface within 6 hours, but small areas continued to smolder below ground for approximately 1 month. Because the protective liner and soil cover limit oxygen from entering into the landfill, they prevent more fires from occurring under the capped area. An extensive air monitoring program was performed during cap construction to demonstrate that public health and the environment of the nearby community were not compromised by air emissions from the subsurface smoldering and landfill capping activities.

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Table 1. Previous Investigations and Removal Actions (continued)

Previous Investigation/ Removal Action ^a	Date(s)	Investigation/Removal Action Activities
Groundwater Data Gaps Investigation	July 2000 to October 2002	The groundwater data gaps investigation was conducted in three phases between 2000 and 2002 to better define the extent of groundwater contamination at HPNS. Water level measurements and a tidal study were used to refine the Parcel E-2 hydrogeological conceptual model, and three rounds of groundwater monitoring were used to develop a basewide groundwater monitoring program.
Radiological Investigations, Phase V (and other interim investigations)	2001 to 2005	In 2001, a characterization survey of the Parcels E and E-2 shoreline was performed that identified the Metal Slag Area. The Phase V investigation was performed from 2002 to 2003 at Parcel E-2. Several areas with elevated levels of radioactivity were reported.
Nonstandard Data Gaps Investigation	October 2001 to November 2002	<p>Four separate investigations were conducted.</p> <ul style="list-style-type: none"> ▪ <u>Wetlands Delineation and Functions and Values Assessment (October 2001 to April 2002)</u>. Two wetland areas were identified at Parcel E-2: (1) about 2.4 acres of tidal wetlands along the shoreline and (2) about 1.3 acres of inland seasonal freshwater wetland in the Panhandle Area. The functions and values assessment found that the value of these wetlands is low. ▪ <u>Landfill Lateral Extent Evaluation (March to April 2002)</u>. Test pits and soil borings were installed to determine that the lateral extent of landfill waste is about 22 acres and the vertical extent varies from 5 to 25 feet thick. ▪ <u>Landfill Liquefaction Potential (April 2002)</u>. The evaluation indicated that most of the cohesionless soil layers (66 to 67 percent) would not liquefy during a MPE. The evaluation determined that, for the remaining soil layers that could liquefy during a MPE, lateral movement of soil below the waste would be less than 4 to 5 feet. The evaluation also concluded that, if containment were selected as the final remediation measure, further analysis would be required to properly design the landfill cap, and ensure the overall stability of the landfill site and other closure features. ▪ <u>Landfill Gas Characterization (April to November 2002)</u>. Ambient air and soil gas surveys were conducted, and GMP01 through GMP21 were installed and monitored on a weekly basis. Results from GMP monitoring indicated that methane, the main component of landfill gas, was present at levels that exceeded the LEL (5 percent by volume in air) in subsurface areas in the northern part of the landfill and aboveground at four areas on the UCSF compound. Trace concentrations of NMOCs were also detected in this area; however, a screening evaluation concluded that the detected levels of NMOCs did not pose an unacceptable risk to human health.
Landfill Gas TCRA	August 2002 to May 2003	A landfill gas barrier wall, monitoring probes, and extraction wells were installed along the northern Parcel E-2 boundary to control gas from moving past the landfill boundary. The barrier wall, which consists of thick interlocking plastic panels, limits landfill gas from moving past the wall and directs it into a collection trench. The monitoring probes are used to verify that landfill gas is properly controlled. The extraction wells, which were used from 2002 to 2003 to remove landfill gas that had migrated under the UCSF facility, are currently used for monitoring purposes only. The Navy continues to operate and maintain the barrier wall to control landfill gas.
Standard Data Gaps Investigation	September 2002 to February 2003	The Navy reviewed aerial photographs and logs from test pits, soil borings, monitoring wells, and GMPs from various investigations at Parcel E-2 to identify known and potential contaminant sources that required additional delineation. Results from the standard data gaps investigation were also used to delineate the PCB Hot Spot Area and to characterize the nature and extent of chemicals in sediment in the Shoreline Area.
Landfill Gas Monitoring and Control	May 2003 to Present	Landfill gas is being monitored on a regular basis under the Interim Landfill Gas Monitoring and Control Plan to verify that hazardous concentrations of landfill gas are not migrating beyond the fence line of the landfill and onto the UCSF compound. The landfill gas control system is operated using both passive venting and active extraction.

Table 1. Previous Investigations and Removal Actions (continued)

Previous Investigation/ Removal Action ^a	Date(s)	Investigation/Removal Action Activities
Interim Cap Inspection and Maintenance	July 2003 to Present	Inspection and maintenance of the interim landfill cap is performed in accordance with a site-specific operation and maintenance plan.
Stormwater Management and Monitoring	July 2003 to Present	Stormwater discharge in Parcel E-2 is managed in accordance with a site-specific plan that is reviewed and updated regularly.
Basewide Groundwater Monitoring Program	June 2004 to Present	The Navy monitors groundwater on a regular basis under this program to evaluate chemicals previously detected at concentrations that may pose a potential risk to human health and the environment.
Metal Slag Area Removal Action	June 2005 to May 2006	The TCRA at the Metal Slag Area was performed to remove metal slag and debris containing low-level radiological material, as well as non-radiological chemical contamination incidental to the area. Approximately 8,200 cubic yards of contaminated soil and sediment, including 119 cubic yards of material with radionuclides, were excavated from this area in the southwest portion of Parcel E-2 and disposed of at one or more approved off-site landfills.
PCB Hot Spot Area Removal Action (Phase 1)	June 2005 to September 2006	The TCRA at the PCB Hot Spot Area was designed to remove PCB- and petroleum hydrocarbon-contaminated soil and debris, possibly containing low-level radiological material. The removal action goals also included removal of free-phase petroleum hydrocarbons to a practical extent. Approximately 44,500 cubic yards of contaminated soil, including 611 cubic yards of material with radionuclides, was excavated from this area in the southeast portion of Parcel E-2 and disposed of at one or more approved off-site landfills.
Groundwater Investigation	September 2007 to June 2008	A focused groundwater investigation was performed to evaluate chemical (i.e., dissolved metals, PCBs, petroleum hydrocarbons, and ammonia) concentrations along the Parcel E-2 shoreline. Study areas included areas adjacent to the Parcel E-2 Landfill, the PCB Hot Spot Area, and Metal Slag Area. The scope of the investigation was expanded to include supplemental sampling for specific radionuclides.
PCB Hot Spot Area Removal Action (Phase 2)	March 2010 to present	The Phase 2 TCRA at the PCB Hot Spot Area was designed to remove contaminated soil and debris from the shoreline portion of the PCB Hot Spot Area, and other select hot spots identified in the RI/FS Report. Approximately 40,000 cubic yards of contaminated soil was excavated from areas not addressed during the Phase 1 TCRA. The excavated soil was disposed of at one or more approved off-site landfills. The fieldwork was completed in 2012.
Ship-Shielding Area Removal Action	May 2012 to present	The TCRA at the Ship-Shielding Area was designed to remove soil and debris potentially containing low-level radiological material (containing ⁶⁰ Co). Approximately 3,300 cubic yards of soil was excavated and screened for radioactivity. Low-level radiological material (containing ⁶⁰ Co) identified during the screening process was disposed of at an approved off-site landfill. The fieldwork was completed in 2012.

Notes:

^a = The documents listed are available in the Administrative Record and provide detailed information used to support remedy selection at Parcel E-2.

⁶⁰Co = cobalt-60

ERA = ecological risk assessment

FS = feasibility study

GMPs = gas monitoring probes

HHRA = human health risk assessment

HPNS = Hunters Point Naval Shipyard

IAS = initial site assessment

IR = Installation Restoration

LEL = lower explosive limit

MPE = maximum probable earthquake

NMOCs = nonmethane organic compounds

OU = Operable Unit

PCB = polychlorinated biphenyl

RI = remedial investigation

SVOCs = semivolatile organic compounds

TCRA = time-critical removal action

UCSF = University of California San Francisco

VOCs = volatile organic compounds

Based on previous investigations and removal actions, the sources and extent of the remaining contamination in soil, sediment, landfill gas, and groundwater have been characterized adequately to select an appropriate remedy. This determination is consistent with [EPA guidance for CERCLA landfills](#)⁽¹²⁾, which presents a specialized RI/FS process intended to improve and accelerate the site characterization and remedy evaluation process and to ensure consistent evaluation of remedial alternatives at similar sites. This process, which was applied to the Parcel E-2 Landfill, is based on the rationale that the unique characteristics of landfills (such as the presence of large volumes of municipal wastes frequently co-disposed with industrial wastes) limit the selection of practicable remedial alternatives. Consistent with EPA guidance, further characterization of solid waste is not necessary or appropriate for selecting a remedy for the Parcel E-2 Landfill. In addition, characterization efforts in the East Adjacent, Panhandle, and Shoreline Areas have provided sufficient data to evaluate potential risks to humans and wildlife because past sampling locations have focused on the most likely contaminant sources (based on a comprehensive review of historic aerial photographs and any visual evidence of contamination), to the extent practical. [Sections 2.3.1, 2.3.2, 2.3.3, 2.3.4, and 2.3.5](#) summarize the nature and extent of nonradioactive contamination in soil, sediment, landfill gas, and groundwater. [Section 2.3.6](#) describes the nature and extent of radionuclides in soil, sediment, and groundwater at Parcel E-2.

2.3.1. Solid Waste and Soil in the Parcel E-2 Landfill

The Navy installed 28 soil borings and 18 monitoring wells and excavated 25 test pits within the Parcel E-2 Landfill to evaluate the nature and extent of contamination. Based on these investigations, the Navy determined that contiguous solid waste in the Parcel E-2 Landfill is composed primarily of municipal-type waste and construction debris. In addition to municipal-type waste and construction debris, historic information indicates that industrial wastes were also disposed of in or around the Parcel E-2 Landfill, including sandblast waste, radioluminescent devices, asbestos-containing debris, paint sludge, solvents, and waste oils. The characterization data suggest that the quantity of industrial waste within the Parcel E-2 Landfill is less than the quantity of municipal-type waste and construction debris.

The soil data set for the Parcel E-2 Landfill includes 333 soil samples collected from the intermittent soil fill mixed with the solid waste. Metals, SVOCs, VOCs, PCBs, pesticides, and petroleum hydrocarbons were detected at [concentrations exceeding the evaluation criteria](#)⁽¹³⁾ in soil samples collected at the Parcel E-2 Landfill. Nearly all of the chemicals detected in Parcel E-2 Landfill soil at concentrations exceeding the evaluation criteria were of a limited extent relative to the overall waste volume. These results indicate that lesser quantities of potentially hazardous industrial wastes are present in the landfill as compared with municipal-type waste and construction debris.

2.3.2. Soil and Isolated Solid Waste in the East Adjacent and Panhandle Areas

The nature and extent of solid waste in the East Adjacent and Panhandle Areas are distinct from the solid waste defined in the Parcel E-2 Landfill. Specifically, fill material in the East Adjacent and Panhandle Areas consists primarily of soil and rock with isolated solid waste locations that are not contiguous with

solid waste in the Parcel E-2 Landfill. Solid waste within the East Adjacent and Panhandle Areas consists of a heterogeneous distribution of construction debris and isolated locations of industrial wastes. The soil data set for the East Adjacent and Panhandle Areas includes 754 soil samples from 113 soil borings, 113 excavation grids within the PCB Hot Spot Area and Metal Slag Area, and 14 test pits. Metals, SVOCs, VOCs, pesticides, PCBs, dioxins and furans, and petroleum hydrocarbons were detected at **concentrations exceeding the evaluation criteria₍₁₃₎** in soil samples collected in the East Adjacent and Panhandle Areas. The noncontiguous and heterogeneous nature of the fill material within the East Adjacent and Panhandle Areas results in a high degree of uncertainty that this fill and the chemicals in soil can be delineated into discrete zones for remediation activities.

2.3.3. Shoreline Sediment

The sediment data set includes 100 samples collected from 50 locations along the Parcel E-2 shoreline. Shoreline sediment was found to contain concentrations of copper, lead, and PCBs that are a **potential source of contamination to Parcel F₍₁₄₎**. In addition, benthic invertebrates, birds, and mammals are at risk from exposure to PCBs in surface sediments along the Parcel E-2 shoreline. Source control measures are warranted along the Parcel E-2 shoreline, particularly in the Metal Slag Area of the Panhandle Area and the Parcel E-2 Landfill, to control potential releases of copper, lead, and PCBs to Parcel F and to mitigate potential risk to benthic invertebrates, birds, and mammals in the shoreline. These conditions warrant the evaluation of remedial alternatives for intertidal sediments along the entire Parcel E-2 shoreline.

2.3.4. Landfill Gas

Landfill gas characterization₍₁₅₎, which consisted of 57 temporary soil gas borings and 21 permanent gas monitoring probes, determined that elevated methane concentrations were present north of the Parcel E-2 Landfill (including property owned by UCSF). The Navy conducted a TCRA that was successful in (1) removing landfill gas and reducing subsurface methane concentrations at the UCSF compound and (2) controlling future migration of landfill gas to off-site areas. Data collected as part of the landfill gas characterization study, the TCRA, and ongoing landfill gas monitoring have adequately defined the nature and extent of landfill gas at Parcel E-2. Additional studies are planned, in conjunction with the remedial design (RD), to more thoroughly evaluate soil gas concentrations in the Panhandle Area and East Adjacent Area and to assess whether methane or non-methane organic compounds (NMOCs) are present in the areas at concentrations that may be hazardous to human health.

2.3.5. Groundwater

Groundwater conditions at Parcel E-2 have been the subject of multiple investigations performed from 1990 through 2008, and the groundwater data set consists of samples collected from 116 A-aquifer wells (including temporary monitoring wells) and 10 B-aquifer wells that were analyzed for various chemicals. Through data collected during these investigations, groundwater contamination has been confirmed in both the A-aquifer and uppermost B-aquifer. **Groundwater contaminants₍₁₆₎** include metals, SVOCs,

VOCs, pesticides, PCBs, petroleum hydrocarbons, and anions (such as ammonia and cyanide). Groundwater sampling results indicated that the concentrations and extent of contamination in the uppermost B-aquifer are less than observed in the A-aquifer because an aquitard is present beneath most of Parcel E-2. Primary potential migration pathways for contaminated groundwater include migration and discharge of A-aquifer groundwater into San Francisco Bay and wetlands and migration of A-aquifer groundwater (including the saturated waste layer) into the uppermost B-aquifer.

2.3.6. Radionuclides in Soil, Sediment, and Groundwater

Past **radiological investigations**⁽¹⁷⁾ have involved collection of over 1,000 soil samples within the upper 6 inches of the ground surface and analysis for a suite of 17 radionuclides. The investigation area was divided into 73 survey units (each 2,000 square meters, or 21,528 square feet); however, one entire survey unit was subsequently excavated during the Phase 1 TCRA at the PCB Hot Spot Area, resulting in data remaining from 72 of the original 73 survey units. Within each survey unit, pertinent statistics for each radionuclide of concern (ROC), including the mean and maximum activity levels and the 95th percent upper confidence limit of the mean activity level (95 UCL activity level), were calculated within each survey unit. For evaluation purposes, the 95 UCL activity levels for each ROC were compared against residential and outdoor worker remediation goals, as established in an action memorandum for the basewide radiological TCRA, to provide the following general assessment of the distribution of **ROCs in surface soil**⁽¹⁸⁾ at Parcel E-2.

- ¹³⁷Cs (an ROC in all radiologically impacted areas at Parcel E-2) – The extent of ¹³⁷Cs in surface soil is moderately extensive because the 95 UCL activity level exceeded the remediation goal (0.113 picocuries per gram [pCi/g]; residential and outdoor worker remediation goals are identical) in 16 out of 72 survey units.
- ²²⁶Ra (an ROC in all radiologically impacted areas at Parcel E-2) – The extent of ²²⁶Ra in surface soil is widespread because the 95 UCL activity level exceeded the remediation goal (1 pCi/g above background not to exceed 2 pCi/g; residential and outdoor worker remediation goals are identical) in 69 out of 72 survey units.
- ⁶⁰Co (an ROC in the Ship-Shielding Area at Parcel E-2) – The extent of ⁶⁰Co in surface soil is moderately extensive because the 95 UCL activity level exceeded the remediation goal for an outdoor worker (0.0602 pCi/g) in three of the eight survey units located in the vicinity of the Ship-Shielding Area. However, using the more conservative residential remediation goal (0.0361 pCi/g), the extent of ⁶⁰Co in surface soil in the vicinity of the Ship-Shielding Area is extensive because the 95 UCL activity level exceeded the remediation goal for residents in all eight of the survey units. As described in **Table 1**, the Navy has initiated a TCRA in the Ship-Shielding Area to address potential ⁶⁰Co contamination. In planning the TCRA, the Navy **revised the remediation goal for ⁶⁰Co**⁽¹⁹⁾ (0.252 pCi/g); this change is further discussed in **Section 2.9.5**.
- ⁹⁰Sr (an ROC in all radiologically impacted areas at Parcel E-2) – ⁹⁰Sr is not present in surface soil at radioactivity levels exceeding the outdoor worker remediation goal (10.8 pCi/g); however, using the more conservative residential remediation goal (0.331 pCi/g), the extent of ⁹⁰Sr in surface soil in Parcel E-2 is moderately extensive because the 95 UCL activity level exceeded the remediation goal for residents in 37 of the 72 survey units.

The extent of radioactive contamination in subsurface soil and shoreline sediment has not been completely defined; however, the selected remedy conservatively assumes, consistent with the findings of the HRA and radiological addendum to the RI/FS Report, that potential radionuclides (specifically, ¹³⁷Cs, ⁶⁰Co, ²²⁶Ra, and ⁹⁰Sr) may be present in subsurface soil and shoreline sediment at Parcel E-2 and will therefore require remedial action. In addition, the RI/FS Report concluded that subsurface soil and shoreline sediment throughout Parcel E-2 contains nonradioactive chemicals that require remedial action. As a result, the selected remedy addresses the potential radionuclides and nonradioactive chemicals in subsurface soil and shoreline sediment at Parcel E-2.

The groundwater data set from two investigations, performed in 2002 and 2008, consists of samples collected from 78 A-aquifer wells and one B-aquifer well and analyzed for ¹³⁷Cs, ²²⁶Ra, and ⁹⁰Sr. The **radionuclide groundwater data**⁽²⁰⁾ were evaluated by simple (non-statistical) threshold comparisons with a fixed standard (such as drinking water standards) and by statistical tests comparing the site data with fixed standards (one-sample statistical tests). Through these comparisons, the radiological addendum concluded that groundwater does not appear to have been impacted by radionuclides at activity levels that warrant remedial action. However, nonradioactive chemicals in groundwater within and in close proximity to the Parcel E-2 Landfill require remedial action, including monitoring, institutional controls, source removal, and containment. As a conservative measure, future monitoring will include analysis for radionuclides in groundwater to verify the conclusions of the radiological addendum.

2.4. CURRENT AND POTENTIAL FUTURE SITE USES

The data analysis, risk evaluations, and remedial alternatives presented in the RI/FS Report assumed that the **future reuse**⁽²¹⁾ of Parcel E-2 will be open space. This assumption was developed in consultation with the City and County of San Francisco based on the 1997 “Hunters Point Shipyard Redevelopment Plan.” Pursuant to the City and County of San Francisco’s **2010 amended Redevelopment Plan**⁽²²⁾, two small areas (less than 1 acre) in the East Adjacent Area were designated as part of the “Shipyard South Multi-Use District” and an adjacent roadway. The Shipyard South Multi-Use District may be used for recreational, industrial, and residential purposes, but these potential land uses were not anticipated during preparation of the RI/FS Report. The Navy, in consultation with the EPA, DTSC, the Water Board, and the City and County of San Francisco, concluded that a **boundary change between Parcels E and E-2**⁽²³⁾ was the most effective way to resolve this discrepancy. **Figure 8** presents the planned reuses within Parcel E-2 and identifies the boundary change between Parcels E and E-2. The revised boundary between Parcels E and E-2 results in the Shipyard South Multi-Use District no longer being located in Parcel E-2, and the planned reuse for Parcel E-2 is now limited to open space.

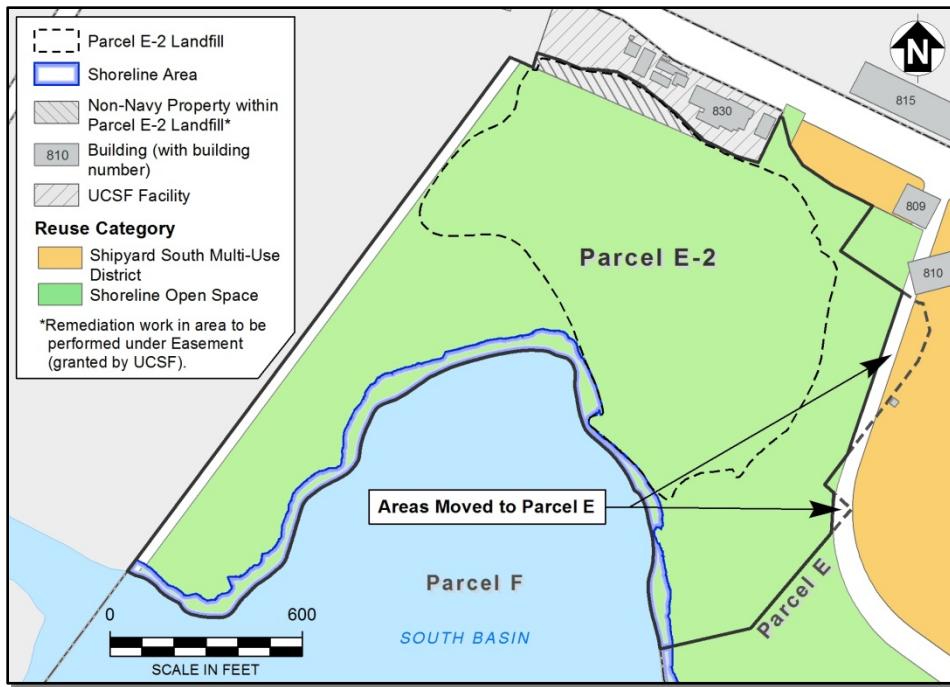


Figure 8. Planned Reuses

Groundwater in the A-aquifer, as discussed in the RI/FS Report, is not suitable for use as [drinking water](#)⁽⁸⁾. Exposures to the A-aquifer were evaluated based on transport of groundwater to San Francisco Bay. Groundwater in the B-aquifer was evaluated as a drinking water source, based on pertinent regulatory criteria, and was determined to have a moderate potential for use as drinking water.

2.5. SUMMARY OF SITE RISKS

Potential contamination at Parcel E-2 is mostly attributed to waste disposal activities by the Navy or other tenants except for several metals (such as arsenic, manganese, and nickel), which were found at concentrations consistent with ambient levels in the local serpentine bedrock. Contaminated media at Parcel E-2 consist of soil, soil gas (emanating from the landfill), groundwater, surface water runoff, and intertidal sediment. The primary contaminant transport mechanisms are (1) surface water runoff into San Francisco Bay, (2) water infiltration and percolation into subsurface soil and groundwater, and (3) landfill gas migration to off-site property. A general conceptual site model (CSM) for Parcel E-2 is provided on [Figure 9](#). Based on the CSM, Parcel E-2 was evaluated for potential risks to human health and the environment in the RI/FS Report and its radiological addendum. [Section 2.5.1](#) presents the results of the human health risk assessment (HHRA). [Section 2.5.2](#) presents the results of the ecological risk assessments.

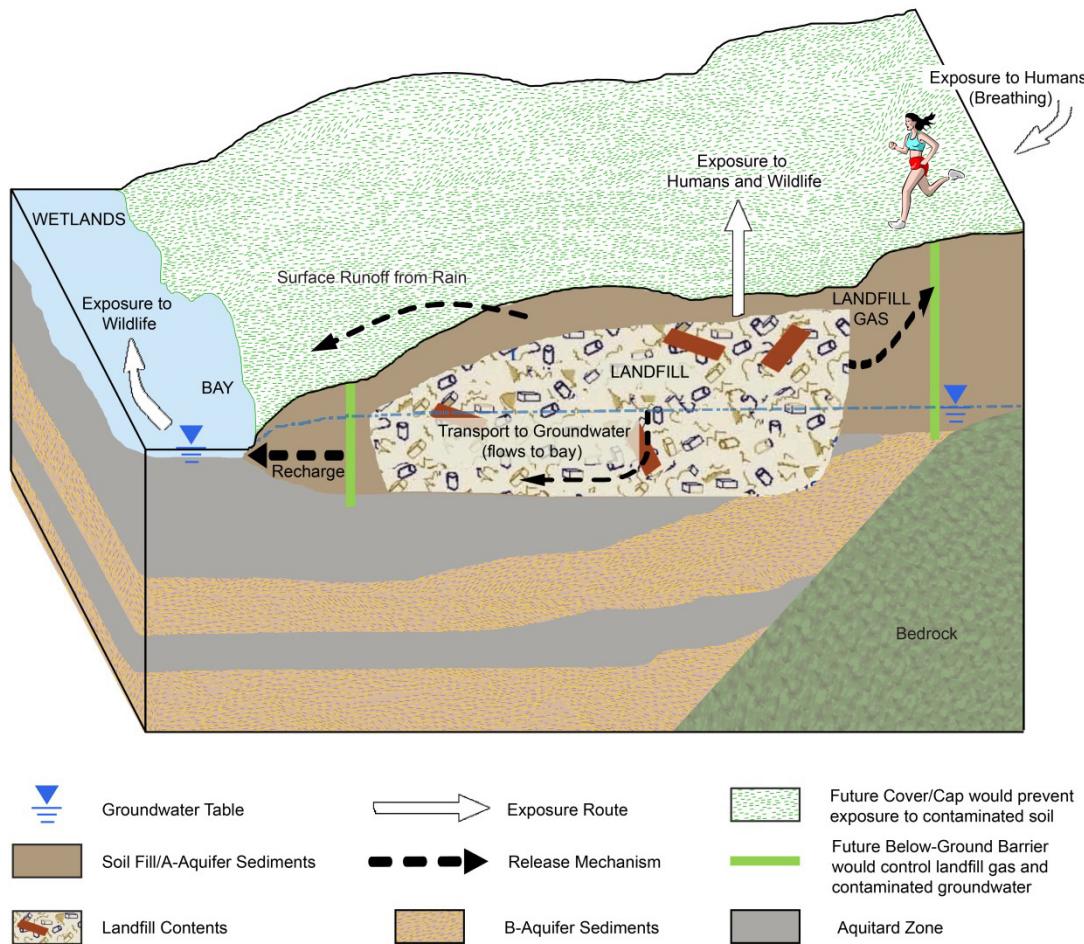


Figure 9. Conceptual Site Model

2.5.1. Human Health Risk Assessment

Based on a [CSM for human health](#)⁽²⁴⁾, a [quantitative HHRA](#)⁽²⁵⁾ was completed for soil and groundwater at the Parcel E-2 Landfill and the East Adjacent and Panhandle Areas. In addition, risks to human health from NMOCs in landfill gas were evaluated using the Johnson and Ettinger vapor intrusion model. Potential [cancer risks and noncancer hazards](#)⁽²⁶⁾ were calculated based on reasonable maximum exposure (RME) assumptions recommended by EPA and DTSC. These assumptions are based on an RME rather than an average or medium range exposure assumption and provide a conservative and protective approach that estimates the highest health risks that are reasonably expected to occur at a site.

Cancer risk is the estimated probability that a person will develop cancer from exposure to site contaminants and is generally expressed as an upper-bound probability. For example, a 1 in 1,000,000 chance is a risk that for every 1,000,000 people, one additional cancer case may occur as a result of exposure to site contaminants. The Navy adopted a conservative approach at Parcel E-2 and evaluated action where potential risk exceeded 1 in 1,000,000, which meets the most conservative end of the risk management range established by EPA.

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Noncancer hazard is the risk of health effects other than cancer, and is expressed as a number called the hazard index (HI). An HI of 1 or less is considered an acceptable exposure level for noncancer health hazards. The Navy evaluated action at Parcel E-2 areas with an HI greater than 1.

Both **total and incremental risks**⁽²⁷⁾ were evaluated for exposure to soil. For the total risk evaluation, all detected chemicals, including naturally occurring metals from the serpentine bedrock-derived fill material, were included as chemicals of potential concern regardless of their concentration. Only the essential nutrients calcium, magnesium, potassium, and sodium were not included as chemicals of potential concern. The total risk evaluation provides an estimate of the risks posed by chemicals and radionuclides at the site, including those present at concentrations at or less than ambient levels. For the incremental risk evaluation, the above essential nutrients and detected metals with maximum measured concentrations less than the Hunters Point ambient levels were excluded as chemicals of potential concern. The incremental risk evaluation provides an estimate of risks posed by metals and radionuclides present at the site that exceed the ambient levels.

Potential unacceptable risks include cancer risks and noncancer hazards for future receptors from exposure to soil or groundwater as discussed below. Potential unacceptable risk is defined as an excess lifetime cancer risk of greater than 1 in 1,000,000 or a segregated HI greater than 1 as calculated by the incremental risk evaluation.

Based on the **HHRA results for nonradioactive chemicals in soil and groundwater**⁽²⁸⁾, cancer risks exceeded 1 in 1,000,000 and noncancer hazards were greater than 1 (see [Tables 2 and 3](#)). In addition, **cancer risks from exposure to radionuclides in soil**⁽²⁹⁾ exceeded 1 in 1,000,000 (see [Table 2](#)). The highest cancer risks and noncancer hazards in soil were driven by PCB concentrations at the western and southwestern sidewall of the PCB Hot Spot Area, where the Phase 1 excavation activities stopped. Risk in this area is being addressed by the Phase 2 TCRA, which is scheduled to be completed in 2012 (see [Section 2.9.2](#) for further information on potential follow-on action in this area). The highest cancer risks and noncancer hazards in groundwater were estimated for future residents that could theoretically drink groundwater beneath Parcel E-2.

Table 2. Cancer Risks and Noncancer Hazards, Soil^a

Parcel E-2 Area	Exposure Scenario	Cancer Risk		Noncancer Hazard Index
		Nonradioactive Chemicals	Radionuclides	
Parcel E-2 Landfill	Recreational	2 in 10,000	2 in 10,000	20
Panhandle Area	Recreational	6 in 10,000	1 in 10,000	6
East Adjacent Area	Recreational	6 in 10,000	2 in 10,000	10

Notes:

a = Listed risk value is the highest calculated value for Parcel E-2; risk is based on conditions before cleanup.

Table 3. Cancer Risks and Noncancer Hazards, Soil Gas and Groundwater^{a,b}

Exposure Pathway	Exposure Scenario	Cancer Risk	Noncancer Hazard Index
Breathing Vapors from Landfill Gas	Residential/Industrial ^c	6 in 10,000,000 (residential) 4 in 10,000,000 (industrial)	<1
Breathing Vapors from Groundwater	Construction Worker	1 in 10,000	<1
Drinking Groundwater	Residential ^d	5 in 1,000	80

Notes:

a = Listed risk value is the highest calculated value for Parcel E-2; risk is based on conditions before cleanup.

b = No complete exposure pathways for planned open space reuse; other pathways evaluated to conservatively estimate risk.

c = Evaluation used gas data collected north of the landfill for residential and industrial exposure scenarios.

d = Evaluation used shallow and deep groundwater data; groundwater is an unlikely source of drinking water because of high natural salt levels.

Estimated cancer risks from exposure to **NMOCs in landfill gas**⁽³⁰⁾ were less than 1 in 1,000,000 and noncancer hazards were less than 1 (see **Table 3**). Although remedial action is not required to mitigate cancer risks or noncancer hazards associated with landfill gas exposure, the selected remedy includes measures to ensure that methane concentrations are controlled within limits specified in California Code of Regulations (Cal. Code Regs.) Title (tit.) 27 § 20921(a). In addition, an NMOC action level of 500 parts per million by volume (ppmv) was developed, as part of the ongoing landfill gas monitoring program, to ensure that cancer risks and noncancer hazards remain within acceptable limits.

The HHRA specifies the **assumptions and uncertainties**⁽³¹⁾ inherent in the risk assessment process due to the number of samples collected or their location, the literature-based exposure and toxicity values used to calculate risk, and risk characterization across multiple media and exposure pathways. The effects of uncertainties are overestimation or underestimation of the actual cancer risk or HI. In general, the risk assessment process is based on the use of conservative (health protective) assumptions that when combined are intended to overestimate the actual risk.

2.5.2. Ecological Risk Assessment

The Navy performed a **screening-level ecological risk assessment**⁽³²⁾ (SLERA) to evaluate risks to wildlife (such as small mammals, birds, and marine life) from exposure to soil and sediment. The SLERA compared soil data against site-specific protective soil concentrations (PSCs) and ambient levels, and shoreline sediment data against various regulatory criteria (most notably, effects range-median values and ambient levels for San Francisco Bay). Based on comparison results, the Navy concluded that contaminated soil and shoreline sediment in Parcel E-2 pose a potential threat to wildlife. COECs include cadmium, copper, lead, manganese, mercury, nickel, vanadium, and zinc; polycyclic aromatic hydrocarbons; total dichlorodiphenyltrichloroethane (i.e., DDT); and total PCBs. The SLERA is a conservative assessment of potential risks to wildlife that was necessitated by the collection of additional data during the soil data gaps investigation in 2002. The Navy determined that the SLERA did not require further refinement because the original baseline ecological risk assessment, performed in 1997 as part of the original Parcel E RI (when Parcel E-2 was part of Parcel E), reached similar conclusions.

In addition, the Navy performed a SLERA to evaluate **risks to aquatic wildlife**⁽³³⁾ from exposure to potentially contaminated groundwater at Parcel E-2. Chemical concentrations in groundwater were screened against the assigned aquatic evaluation criteria, mainly comprising saltwater aquatic criteria, to identify chemicals of potential ecological concern (COPECs) for surface water quality. Site-specific data for select COPECs were then evaluated against **trigger levels**⁽³⁴⁾, consistent with the methods used in recent FS reports at other HPNS parcels, to further confirm if the COPECs needed to be addressed in remedial alternatives. Based on concentrations exceeding trigger levels (as adjusted based on ambient levels), the following chemicals (or groups of chemicals) pose a potential risk to aquatic wildlife exposed to potentially contaminated groundwater at Parcel E-2: copper, lead, and zinc; un-ionized ammonia, sulfide, and cyanide; PCBs; and TPH.

2.5.3. Basis for Response Action

The response action selected in this ROD is necessary to protect the public health, welfare, or the environment from actual or potential releases of hazardous substances into the environment. The Navy, in partnership with EPA, DTSC, and the Water Board, considered all pertinent factors in accordance with CERCLA and NCP remedy selection criteria and determined that remedial action is necessary to clean up soil, sediment, groundwater, landfill gas, and radiologically-impacted sanitary sewer and storm drain lines and soil at Parcel E-2. This determination was made because:

- Based on the HHRA results for **nonradioactive chemicals in soil**⁽³⁵⁾ and **groundwater**⁽³⁶⁾, cancer risks exceed 1 in 1,000,000 and noncancer hazards were greater than 1 (see [Tables 2 and 3](#)).
- Cancer risks from exposure to **radionuclides in soil**⁽³⁷⁾ exceed 1 in 1,000,000 (see [Table 2](#)).
- Methane concentrations in **landfill gas**⁽³⁸⁾ must be controlled within limits specified in Cal. Code Regs. tit. 27 § 20921(a).
- Based on the **SLERA results**⁽³⁹⁾, chemical concentrations in soil, shoreline sediment, and groundwater in Parcel E-2 pose a potential threat to wildlife.

The HHRA identified numerous nonradioactive COCs and several ROCs (specifically, ¹³⁷Cs, ⁶⁰Co, ²²⁶Ra, and ⁹⁰Sr) in soil present at concentrations that posed an unacceptable cancer risk or noncancer hazard. The elevated concentrations of several COCs (most notably lead and PCBs) and one ROC (²²⁶Ra) were found to be dispersed over large portions of Parcel E-2. The widespread extent of these COCs and ROC prompted the Navy to consider a combination of removal and containment options in developing potential response actions. Specifically, the Navy identified an approach that proposed removal of the soil areas that posed the most significant risk to humans, and proposed containment for the remaining soil areas that posed a lower risk to humans.

In identifying potential areas for removal, the Navy focused the list of COCs to those nonradioactive chemicals present at concentrations that exceeded the **remediation goals**⁽⁴⁰⁾, which generally correspond to a cancer risk of 1 in 1,000,000 or a noncancer HI of 1, by a factor of 10 or 100. Areas containing elevated nonradioactive COC concentrations pose the most significant risk to humans and are referred to as **hot spots**⁽⁴¹⁾. Similarly, the Navy focused the list of COECs in soil and sediment to those nonradioactive chemicals present at concentrations that exceeded the remediation goals (corresponding to PSCs and other pertinent regulatory criteria) by a factor of 10 or 100.

The hot spots identified based on the process described above were categorized based on their potential risk to humans and wildlife:

- Nearshore hot spots were determined to pose the most substantial risk because they are a continuing source to groundwater contamination and are located in close proximity to San Francisco Bay. For COCs and COECs at these locations, hot spot goals were established at 10 times the remediation goals.
- Upland hot spots were determined to pose a slightly lower risk because they do not appear to be a continuing source to groundwater contamination and are located farther inland from San Francisco Bay. For COCs and COECs at these locations, hot spot goals were established at 100 times the remediation goals.
- An area was identified that appears to be a continuing source of VOCs to groundwater. Although this source area does not pose a risk to future recreational users at Parcel E-2, it could migrate to the adjacent Parcel E property at concentrations that may pose an unacceptable risk to future occupants. For VOCs at these locations, hot spot goals were established equal to the remediation goals for future residential occupants (consistent with the planned reuse at the adjacent Parcel E property).

[Figure 10](#) identifies the locations of COCs and COECs at the nearshore hot spots, upland hot spots, and VOC source area. The Navy is excavating some of the hot spots identified in the ROD pursuant to a Phase 2 TCRA Action Memorandum for the PCB Hot Spot Area (see [Figure 7](#)). However, because hot spot goals have not been achieved through excavation at the date of ROD signature, the excavations to achieve hot spot goals will be completed as a remedial action pursuant to this ROD (see [Section 2.9.2](#) for further information on follow-on action in this area).

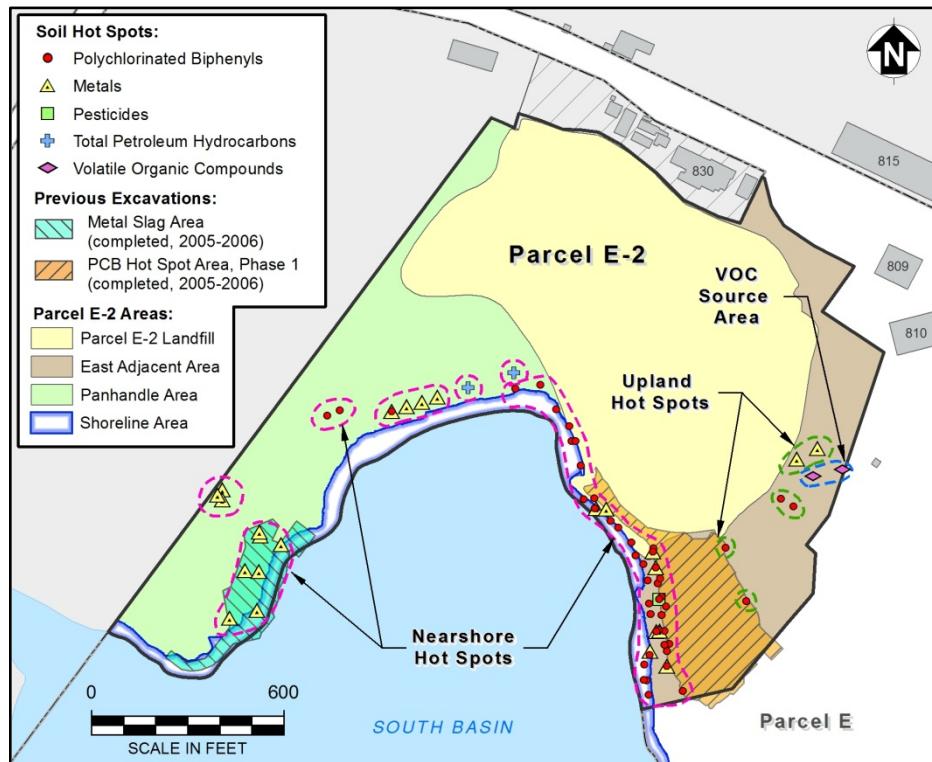


Figure 10. Hot Spots in Soil and Sediment

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Table 4 identifies the COCs and COECs at the soil hot spots, along with the most stringent remediation goals and hot spot goals for each COC and COEC.

Table 4. Chemicals of Concern at Hot Spots

Hot Spot Category	Impacted Media	COC/COEC	Remediation Goal (mg/kg)	Hot Spot Goal (mg/kg)	Basis for Hot Spot Goal
Nearshore Hot Spots	Soil	Copper	470	4,700	10 times remediation goal for terrestrial wildlife ^a
		Heptachlor epoxide	0.21	2.1	10 times remediation goal for recreational users ^a
		Lead	197	1,970	10 times remediation goal for terrestrial wildlife ^a
		Total PCBs	0.74	7.4	10 times remediation goal for recreational users ^a
		Total TPH	3,500	3,500	TPH source criterion ^b
		Zinc	719	7,190	10 times remediation goal for terrestrial wildlife ^a
	Intertidal Sediment	Copper	270	2,700	10 times remediation goal for aquatic wildlife ^a
		Lead	218	2,180	10 times remediation goal for aquatic wildlife ^a
		Total PCBs	0.18	1.8	10 times remediation goal for aquatic wildlife ^a
		Total TPH	3,500	3,500	TPH source criterion ^b
	Soil	Lead	197	19,700	100 times remediation goal for terrestrial wildlife ^a
		Total PCBs	0.74	74	100 times remediation goal for recreational users ^a
		Total TPH	3,500	3,500	TPH source criterion ^b
VOC Source Area	Soil	1,1-Dichloroethane	--	2.8	Residential RBC (for Parcel E) ^c
		Tetrachloroethene	--	0.48	Residential RBC (for Parcel E) ^c
		Trichloroethene	--	2.9	Residential RBC (for Parcel E) ^c
		Vinyl chloride	--	0.024	Residential RBC (for Parcel E) ^c

Notes:

- a Remediation goals for recreational users, terrestrial wildlife, and aquatic wildlife are detailed in [Table 5](#).
- b The TPH source criterion represents the most conservative evaluation criterion for potential sources of groundwater contamination that may impact aquatic wildlife in San Francisco Bay, and is selected as the hotspot goal in areas where total TPH is known to be present in groundwater at concentrations exceeding the corresponding remediation goal (see [Table 7](#) and [Figure 11](#)). The presence of total TPH at individual hot spots will be further evaluated in the remedial design.
- c Residential RBCs (for the select VOCs that are present in Parcel E-2 and impact groundwater at Parcel E at concentrations that pose a risk to humans) represent the most conservative evaluation criteria and are selected as hotspot goals to maximize the effectiveness of the VOC source removal effort and on the presumption that, based on available site data, the VOC source area is limited in volume (see [Figure 10](#)).

COC = chemical of concern

COEC = chemical of ecological concern

mg/kg = milligrams per kilogram

PCBs = polychlorinated biphenyls

RBC = risk-based criteria

TPH = total petroleum hydrocarbons

VOC = volatile organic compounds

-- = not applicable

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The Navy focused the removal for ROCs to the surface of radiologically impacted areas in Parcel E-2 (see [Figure 3](#)) because these areas posed the most significant risk to future recreational users. Following cleanup of ROCs near the ground surface, a cover (comprised of clean imported soil and geosynthetic material) and institutional controls, would effectively prevent unacceptable exposures to remaining concentrations of COCs and ROCs.

The HHRA identified numerous nonradioactive COCs in groundwater present at concentrations that exceeded remediation goals corresponding to either a cancer risk level of 1 in 1,000,000 or a noncancer hazard index of 1. In evaluating potential response actions, the Navy determined that potential risks to humans from exposure to groundwater could be adequately addressed through institutional controls and monitoring. However, the SLERA identified several nonradioactive COPECs in groundwater that could migrate to San Francisco Bay at concentrations that exceed evaluation criteria for aquatic wildlife. The COPECs identified are copper, lead, and zinc; un-ionized ammonia, sulfide, and cyanide; PCBs; and TPH. [Figure 11](#) identifies the groundwater areas where COPECs are present at concentrations that pose a potential risk to aquatic wildlife. Remedial action, in the form of source removal, containment, and monitoring, is needed to address this potential risk, and will be further evaluated in the RD using results from the ongoing groundwater monitoring program. Un-ionized ammonia and sulfide are not shown on [Figure 11](#) because these COPECs are generated during decomposition of organic matter (both naturally occurring and anthropogenic) in reducing environments, and are readily transformed to non-toxic compounds upon discharge to oxygenated surface water. Accordingly, neither source removal nor containment is needed to protect aquatic wildlife from exposure to these COPECs; however, monitoring for these COPECs will be performed to verify the protectiveness of the remedy. As discussed in [Section 2.3.6](#), the radiological addendum concluded that groundwater does not appear to have been impacted by

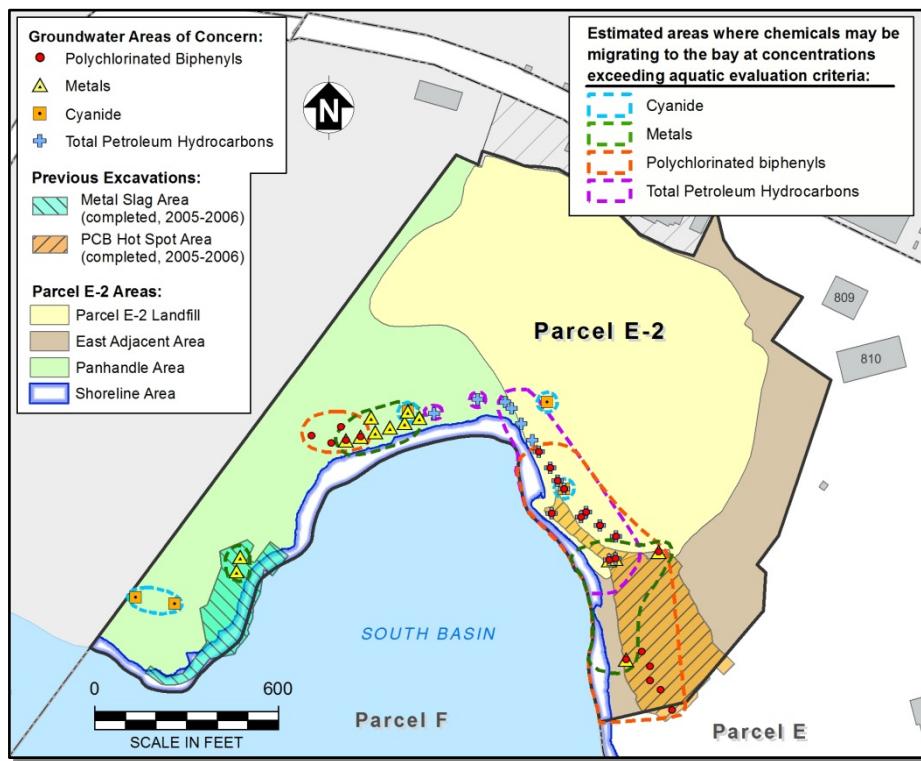


Figure 11. Groundwater Areas Posing a Potential Risk to Aquatic Wildlife

radionuclides at activity levels that warrant remedial action; however, because monitoring is being performed for various COCs and COPECs, future monitoring will include analysis for radionuclides in groundwater to verify the conclusions of the radiological addendum.

2.6. PRINCIPAL THREAT WASTE

According to EPA's "Guide to Principal Threat and Low Level Threat Wastes," principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. The Navy identified **potential hot spots within the northern and central portions of the Parcel E-2 Landfill**⁽⁴²⁾, but determined that these materials are not principal threat wastes because they (1) are located at relatively deep depths (8 to 17 feet below ground surface [bgs]); (2) have not migrated to A- or B-aquifer groundwater; (3) are located far from the Parcel E-2 shoreline (390 to 780 feet); and (4) are not connected with the PCB Hot Spot Area.

Following the Phase 1 TCRA at the PCB Hot Spot Area, remaining chemical concentrations were identified as potential principal threat wastes because (1) PCB and heptachlor epoxide concentrations exceed the remediation goals by more than 100 times and are located at relatively shallow depths (0.5 to 7 feet bgs); (2) PCB and heptachlor epoxide were reported in groundwater during a subsequent data gaps investigation in this area; and (3) the area is located along the Parcel E-2 shoreline. To promptly address this potential threat, the Navy initiated a Phase 2 TCRA in this area in 2010, which is scheduled to be completed in 2012 (see [Section 2.9.2](#) for further information on potential follow-on action in this area).

In addition, elevated lead concentrations in the East Adjacent Area were identified as potential principal threat wastes because concentrations exceed the remediation goals by more than 100 times and are located at relatively shallow depths (4 feet bgs). To promptly address this potential threat, the Navy added this area to the Phase 2 TCRA at the PCB Hot Spot Area. As discussed previously, the Phase 2 TCRA is scheduled to be completed in 2012 (see [Section 2.9.2](#) for further information on potential follow-on action in this area).

2.7. REMEDIAL ACTION OBJECTIVES

Remedial action objectives⁽⁴³⁾ (RAOs) are established based on attainment of regulatory requirements, standards, and guidance; contaminated media; COCs and COECs; potential receptors and exposure scenarios; and human health and ecological risks. Ultimately, the success of a remedial action is measured by its ability to meet the RAOs. Planned future land use is an important component in developing RAOs, and the RAOs for Parcel E-2 are based on future open space reuse.

The RAOs for Parcel E-2 were developed in conjunction with the regulatory agencies and are listed below by medium.

Soil and Sediment RAOs

1. Prevent human exposure to inorganic and organic chemicals at concentrations greater than remediation goals (see [Table 5](#)) for the following exposure pathways:
 - Ingestion of, outdoor inhalation of, and dermal exposure to solid waste, soil, or sediment from 0 to 2 feet bgs by recreational users throughout Parcel E-2.
 - Ingestion of, outdoor air inhalation of, and dermal exposure to solid waste, soil, or sediment from 0 to 10 feet bgs by construction workers throughout Parcel E-2.
2. Prevent ecological exposure to concentrations of inorganic and organic chemicals in solid waste or soil greater than remediation goals (see [Table 5](#)) from 0 to 3 feet bgs by terrestrial wildlife throughout Parcel E-2.
3. Prevent ecological exposure to concentrations of inorganic and organic chemicals in intertidal sediment greater than remediation goals (see [Table 5](#)) from 0 to 2.5 feet bgs by aquatic wildlife throughout the Shoreline Area.
4. Prevent exposure to ROCs at activity levels that exceed remediation goals (see [Table 6](#)) for all potentially complete exposure pathways.

Landfill Gas RAOs

1. Control methane concentrations to 5 percent (by volume in air) or less at subsurface points of compliance.
2. Control methane concentrations to 1.25 percent (by volume in air) or less in on-site structures (“on site” for this ROD is defined as any area within the subsurface points of compliance for landfill gas).
3. Prevent exposure to NMOCs at concentrations greater than 500 ppmv at the subsurface points of compliance.
4. Prevent exposure to NMOCs at concentrations greater than 5 ppmv above background levels in the breathing zone of on-site workers and visitors.

Groundwater RAOs, Domestic Use

1. Prevent exposure to groundwater that may contain COCs at concentrations greater than remediation goals (see [Table 7](#)) through the domestic use pathway.
2. Prevent or minimize migration of B-aquifer groundwater that may contain COCs at concentrations greater than remediation goals (see [Table 7](#)) beyond the **point of compliance**⁽⁴⁴⁾ (defined in the RI/FS Report at the downgradient boundary of Parcel E-2).

Groundwater RAOs, Construction Worker

1. Prevent or minimize dermal exposure to and vapor inhalation from A-aquifer groundwater containing COCs at concentrations greater than remediation goals (see [Table 7](#)) by construction workers.

Groundwater RAOs, Protection of Wildlife

1. Prevent or minimize migration of COPECs to prevent discharge that would result in concentrations greater than the corresponding **water quality criteria**⁽⁴⁵⁾ for aquatic wildlife.
2. Prevent or minimize migration of A-aquifer groundwater containing total TPH concentrations greater than the remediation goal (see [Table 7](#)) (where commingled with CERCLA substances) into San Francisco Bay.

Surface Water RAOs

1. Prevent or minimize migration of COPECs to prevent discharge that would result in concentrations greater than the corresponding **water quality criteria**⁽⁴⁵⁾ for aquatic wildlife.

[Table 5](#) lists the remediation goals for COCs and COECs in soil and sediment. [Table 6](#) lists the remediation goals for ROCs in soil and sediment, and reflects the **revised remediation goal for ⁶⁰Co**⁽¹⁹⁾. [Table 7](#) lists the remediation goals for COCs and COECs in groundwater. With the exception of total TPH, chemicals in groundwater that may pose a risk to aquatic wildlife in San Francisco Bay (see [Figure 11](#)) are considered COPECs given the conservative nature of the groundwater SLERA (see [Section 2.5.2](#)). As such, groundwater remediation goals have not been developed for these COPECs. However, the groundwater COPECs are addressed under the selected remedy through source removal, containment, and monitoring actions.

Development of groundwater monitoring criteria for COPECs is problematic at this stage because of the conservative nature of the groundwater SLERA. The water quality criteria, as referenced in the groundwater RAO, are based on standards for aquatic wildlife in San Francisco Bay, apply to surface water at the interface of the A-aquifer groundwater, and do not apply to in-situ A-aquifer groundwater at Parcel E-2. Development of specific monitoring criteria for A-aquifer groundwater that address the potential risk to aquatic wildlife in San Francisco Bay requires a more refined fate and transport modeling to more rigorously assess the groundwater-to-surface water transport mechanism. Such refined modeling is not considered necessary to proceed with the ROD because, as stated above, the source removal, containment, and monitoring actions, as evaluated in the remedial alternatives, will address the potential risk to aquatic wildlife in San Francisco Bay. The Navy, with input from regulatory agencies, will develop specific monitoring criteria for A-aquifer groundwater and refine the fate and transport modeling, as needed to support development of the monitoring criteria, during the RD phase.

Table 5. Remediation Goals for Nonradioactive Chemicals in Soil and Sediment

Exposure Scenario	COC/COEC	Remediation Goal (mg/kg)	Exposure Scenario	COC/COEC	Remediation Goal (mg/kg)
Recreational	Antimony	270	Construction Worker (continued)	Dioxin (TEQ)	0.000023
	Aroclor-1242	0.74		Heptachlor epoxide	1
	Aroclor-1248	0.74		Indeno(1,2,3-cd)pyrene	6.5
	Aroclor-1254	0.74		Iron	93,000
	Aroclor-1260	0.74		Lead	800
	Arsenic	11.1		Manganese	6,900
	Benzo(a)anthracene	1.3		Naphthalene	75
	Benzo(a)pyrene	0.33		Total PCBs (non-dioxin)	2.1
	Benzo(b)fluoranthene	1.3		Total TPH	3,500
	Benzo(k)fluoranthene	1.3		Vanadium	310
	Dieldrin	0.12	Terrestrial Wildlife	Cadmium	4.2
	Heptachlor epoxide	0.21		Copper	470
	Indeno(1,2,3-cd)pyrene	1.3		Lead	197
	Lead	155		Manganese	2,433
	Total PCBs (Non-Dioxin)	0.74		Mercury	1.0
Construction Worker	4,4'-DDT	45	Aquatic Wildlife	Nickel	1,941
	Antimony	120		Vanadium	117
	Aroclor-1016	7.4		Zinc	719
	Aroclor-1242	2.1		Total DDT	3.53
	Aroclor-1248	2.1		Total PCBs	37
	Aroclor-1254	2.1		Total HMW PAHs	231
	Aroclor-1260	2.1		Antimony	25
	Arsenic	11.1		Copper	270
	Benzo(a)anthracene	6.5		Lead	218
	Benzo(a)pyrene	0.65		Mercury	0.71
	Benzo(b)fluoranthene	6.5		Nickel	112
	Benzo(k)fluoranthene	6.5		Zinc	410
	Cadmium	150		Total DDTs	0.046
	Copper	11,000		Dieldrin	0.008
	Dibenz(a,h)anthracene	1.1		Endrin	0.045
	Dieldrin	0.57		Total PCBs	0.18

Notes: The basis (risk-based or ambient level) for the remediation goals is presented in Sections 7 and 9 of the RI/FS Report.

COC = chemical of concern

mg/kg = milligrams per kilogram

COEC = chemical of ecological concern

PAHs = polycyclic aromatic hydrocarbons

DDT = dichlorodiphenyltrichloroethane

PCBs = polychlorinated biphenyls

HMW = high-molecular weight

TEQ = toxic equivalent

Table 6. Remediation Goals for Radionuclides in Soil and Sediment

Radionuclide of Concern	Exposure Scenario	
	Outdoor Worker (pCi/g)	Resident ^a (pCi/g)
Cesium-137	0.113	0.113
Cobalt-60	0.252 ^b	0.252 ^b
Radium-226	1.0 ^c	1.0 ^c
Strontium-90	10.8	0.331

Notes: The basis (risk-based) for the remediation goals is presented in Sections 7 and 9 of the radiological addendum.

a = Residential use is not planned for Parcel E-2, but residential goals are proposed as an additional level of protection.

b = Remediation goal for cobalt-60 was revised to support efficient laboratory gamma spectroscopy analysis of soil samples. This revised remediation goal maintains morbidity risks within the EPA-defined acceptable range and permits an exposure level that does not increase the risk of cancer from a potential exposure to cobalt-60.

c = Remediation goal is 1 pCi/g above background per agreement with EPA (established in "Final Basewide Radiological Removal Action, Action Memorandum – Revision 2006, Hunters Point Shipyard, San Francisco, California," dated April 21, 2006), and is consistent with the radiological-related remedies selected in the RODs for Parcels B, G, and D-1 and UC-1. The radium-226 background level for surface soil is 0.633 pCi/g. The radium-226 background level for storm drain and sewer lines is 0.485 pCi/g. The background levels for radium-226 may be reevaluated in the Parcel E-2 RD and are subject to regulatory agency approval.

EPA = U.S. Environmental Protection Agency

pCi/g = picocuries per gram

RD = remedial design

RODs = Records of Decision

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Table 7. Remediation Goals for Groundwater

Exposure Scenario	COC/COEC	Remediation Goal (µg/L)	Exposure Scenario	COC/COEC	Remediation Goal (µg/L)
Construction Worker Exposure to Shallow Groundwater	Benzo(a)anthracene	0.67	Domestic Use of Deep Groundwater	Bis(2-ethylhexyl)phthalate	10
	Benzo(a)pyrene	0.05		beta-BHC	0.05
	Benzo(b)fluoranthene	0.45		Carbon tetrachloride	0.5
	Benzo(k)fluoranthene	0.45		Chloroform	80
	Dibenz(a,h)anthracene	0.05		Chromium VI	109
	Indeno(1,2,3-cd)pyrene	0.31		Chrysene	0.56
	Lead	15		Dibenz(a,h)anthracene	2
Domestic Use of Deep Groundwater	1,1-Dichloroethane	5		Dieldrin	0.02
	1,2,3-Trichloropropane	1		Heptachlor	0.01
	1,2-Dichloroethane	0.5		Heptachlor epoxide	0.01
	1,4-Dichlorobenzene	5		Heptachlor epoxide A	0.01
	4-Nitrophenol	3.4		Heptachlor epoxide B	0.01
	Aroclor-1016	0.5		Indeno(1,2,3-cd)pyrene	0.2
	Aroclor-1242	0.5		Iron	10,950
	Aroclor-1254	0.5		Lead	15
	Aroclor-1260	0.5		Methylene chloride	5
	Arsenic	10		Naphthalene	1
	Benzene	1		Tetrachloroethene	5
	Benzo(a)anthracene	0.2		Thallium	2
	Benzo(a)pyrene	0.2		Trichloroethene	5
	Benzo(b)fluoranthene	0.2		Vinyl chloride	0.5
	Benzo(k)fluoranthene	0.2		Total TPH (goals vary based on distance from the bay) ^a	1,400 to 20,000
			Wildlife in the bay		

Notes: The basis (risk-based, regulatory limit, or ambient level) for the remediation goals is presented in Sections 7 and 9 of the RI/FS Report.

^a =The distance-based TPH criteria are as follows:

Distance from shoreline (feet)	Total TPH (µg/L)	Distance from shoreline (feet)	Total TPH (µg/L)
0-<25	1,400	125-<150	6,949
25-<50	1,467	150-<175	9,539
50-<75	2,092	175-<200	12,604
75-<100	3,216	200-<225	16,145
100-<125	4,839	≥225	20,000

BHC = benzene hexachloride

COC = chemical of concern

COEC = chemical of ecological concern

TPH = total petroleum hydrocarbons

µg/L = micrograms per liter

2.8. DESCRIPTION AND EVALUATION OF REMEDIAL ALTERNATIVES

The Navy screened a range of **general response actions and remedial technologies**⁽⁴⁶⁾ and then, using the retained technologies, developed alternatives in the FS to address contamination at Parcel E-2. In developing the remedial alternatives, the Navy evaluated conditions at the Parcel E-2 Landfill relative to specific criteria established by EPA in their **presumptive remedy guidance**⁽⁴⁷⁾ for CERCLA landfills. The Navy determined that the Parcel E-2 Landfill meets all of the criteria specified in EPA's presumptive remedy guidance, and that the FS could be simplified to focus only on containment of the Parcel E-2 Landfill. However, based on feedback from members of the local community, the Navy chose to evaluate complete excavation of the landfill in the FS (Alternative 2) to provide information to support the community's review of potential remedial alternatives for Parcel E-2. In addition, the Navy evaluated several remedial alternatives (Alternatives 3, 4, and 5) involving containment with removal of nearshore and upland hot spots that, as described in [Section 2.5.3](#), are located outside of the Parcel E-2 Landfill and pose a significant risk to humans and wildlife.

2.8.1. Description of Remedial Alternatives

The remedial alternatives evaluated for Parcel E-2 are listed and briefly described below. [Table 8](#) on the following page describes the major components and cost of each remedial alternative identified for Parcel E-2.

- **Alternative 1 – No Action:** For this alternative, no remedial action would take place. The no action alternative is retained throughout the FS process as required by the NCP to provide a baseline for comparison with and evaluation of other alternatives.
- **Alternative 2 – Excavate and Dispose of Solid Waste, Soil, and Sediment (including monitoring, institutional controls, and unlined freshwater wetlands):** This alternative consists of removing all waste and contaminated soil from the 22-acre Parcel E-2 Landfill (up to 30 feet deep, which includes soil under the waste that may be contaminated) and all shallow soil and sediment from the Panhandle Area, East Adjacent Area, and Shoreline Area. The proposed excavation within the Panhandle Area, East Adjacent Area, and Shoreline Area would eliminate exposure to contamination, in accordance with the exposure depths specified in the risk assessments (3 to 4 feet deep in most areas), and would extend deeper in areas with known nonradiological chemical hot spots (up to 16 feet deep). Alternative 2 would involve excavating an estimated 1,166,000 cubic yards of waste, soil, and sediment from Parcel E-2 and disposing of it at one or more approved off-site landfills, as appropriate. Over 1,000,000 cubic yards of this estimated volume would be removed from the Parcel E-2 Landfill; this volume consists of an estimated 473,000 cubic yards of solid waste, 393,500 cubic yards of overlying soil cover, and 141,750 cubic yards of soil below the solid waste that is likely contaminated. The excavations would be backfilled with an estimated 400,000 cubic yards of clean imported soil, meeting stringent chemical and radiological acceptance criteria, that would result in lower final ground surface elevations (as compared to existing conditions).

Table 8. Remedial Alternatives

Remedial Alternative Number and Key Components		Cost
1	No actions or costs; this alternative is required by CERCLA as a baseline for comparison with the other alternatives.	No cost
2	<p>Excavation and Off-Site Disposal: Excavate all waste and contaminated soil in the Parcel E-2 Landfill and all shallow waste, soil, and sediment in the Panhandle Area, East Adjacent Area, and Shoreline Area. Dispose of excavated waste and contaminated soil and sediment at an off-site landfill.</p> <p>Wetlands Restoration in Panhandle Area and Shoreline Area: Build new tidal and freshwater wetlands with appropriate soil and vegetation. Maintain and monitor wetlands.</p> <p>Groundwater Monitoring/ICs: Implement long-term monitoring of groundwater to assess whether chemicals are migrating and to monitor changes in ambient conditions. Impose ICs to limit the use of land or restrict activities that take place within an area.</p> <p>Additional Radiological Actions: Excavate potential radioactive contamination from (1) drain lines that extend into the East Adjacent Area but are located outside of the boundary of IR Site 01/21, and (2) berm in the Ship-Shielding Area. Dispose of excavated waste and soil at an off-site landfill. Perform final radiological surveys at all excavated areas prior to backfilling with clean, imported soil.</p>	<p>Capital Cost: \$363.2M⁽⁴⁸⁾</p> <p>Total O&M Cost: \$3.8M</p> <p>Present-Worth Cost: \$351.5M (2.8% discount rate)</p> <p>Timeframe: 34 years</p> <p><i>Note: Cost includes \$5.5M for radiological actions⁽⁴⁹⁾ that are common to each alternative.</i></p>
3	<p>Excavation and Off-Site Disposal: Excavate all radioactive contamination near the ground surface. Excavate select nearshore hot spots in the Panhandle Area, East Adjacent Area, and Shoreline Area. Dispose of excavated waste and soil at an off-site landfill.</p> <p>Excavation and On-Site Consolidation: Excavate soil and debris from the parts of the Panhandle Area planned for new wetlands, and excavate sediment and debris from the Shoreline Area. Consolidate excavated soil, sediment, and debris at Parcel E-2.</p> <p>Containment: Install soil cover over all of Parcel E-2 and place a protective liner under the soil cover in all areas except the new tidal wetlands in the Panhandle Area. Build shoreline revetment at the edge of the soil cover. Perform active landfill gas extraction and treatment. Install below-ground barrier and drain at western boundary to divert groundwater flow into the landfill. Inspect and maintain soil cover, protective liner, groundwater barrier/drain, and gas control system.</p> <p>Wetlands Restoration in Panhandle Area: Build new tidal wetlands with appropriate soil and vegetation, but without a liner and shoreline revetment. Build new freshwater wetlands with appropriate soil and vegetation, and with a liner and shoreline revetment. Maintain and monitor wetlands.</p> <p>Monitoring/ICs: Implement long-term monitoring of landfill gas, stormwater, and groundwater to assess whether chemicals are migrating and to monitor changes in ambient conditions. Impose ICs to limit the use of land or restrict activities that take place within an area.</p> <p>Additional Radiological Actions: Excavate potential radioactive contamination from (1) drain lines that extend into the East Adjacent Area but are located outside of the boundary of IR Site 01/21, and (2) berm in the Ship-Shielding Area. Dispose of excavated waste and soil at an off-site landfill. Perform final radiological surveys at all excavated areas prior to backfilling with clean, imported soil.</p>	<p>Capital Cost: \$62.4M⁽⁵⁰⁾</p> <p>Total O&M Cost: \$26.0M</p> <p>Present-Worth Cost: \$78.4M (2.8% discount rate)</p> <p>Timeframe: 32 years</p> <p><i>Note: Cost reflects the more expensive landfill gas treatment option (Option B); the specific treatment option will be identified in the remedial design. Cost also includes \$5.5M for radiological actions that are common to each alternative.</i></p>
4	<p><i>All of the same elements as Alternative 3, but would also include:</i></p> <p>Additional Excavation and Off-Site Disposal: Excavate additional nearshore and upland hot spots in the Panhandle Area, East Adjacent Area, and Shoreline Area (Tiers 3, 4, and 5 hot spots). Dispose of excavated waste and soil at an off-site landfill.</p> <p>Groundwater Containment: Build below-ground barrier along shoreline to better limit the flow of contaminated groundwater to San Francisco Bay. Extend the below-ground barrier south into the PCB Hot Spot Area, if needed to protect the bay.</p> <p>Natural Clay Liner for Freshwater Wetlands: New freshwater wetlands would be built with a natural clay liner.</p>	<p>Capital Cost: \$70.8M⁽⁵¹⁾</p> <p>Total O&M Cost: \$26.0M</p> <p>Present-Worth Cost: \$86.6M (2.8% discount rate)</p> <p>Timeframe: 32 years</p> <p><i>Same notes as Alternative 3.</i></p>
5	<p><i>All of the same elements as Alternative 4, but would also include:</i></p> <p>No Liner for Freshwater Wetlands: New freshwater wetlands would be built without a liner.</p>	<p>Capital Cost: \$70.9M⁽⁵²⁾</p> <p>Total O&M Cost: \$26.0M</p> <p>Present-Worth Cost: \$86.7M (2.8% discount rate)</p> <p>Timeframe: 32 years</p>

Notes:

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

O&M = operation and maintenance

ICs = institutional controls

PCB = Polychlorinated Biphenyl

IR = Installation Restoration

- **Alternative 3 – Contain Solid Waste, Soil, and Sediment with Hot Spot Removal (including monitoring, institutional controls, and lined freshwater wetlands):** This alternative consists of removing contaminated soil from nearshore hot spots adjacent to the PCB Hot Spot and Metal Slag Areas and disposing of it at one or more approved off-site landfills, as appropriate, followed by covering the remaining soil, waste, and sediment with at least 2 feet of clean soil. Alternative 3 would involve excavating 15,500 cubic yards of waste, soil, and sediment from Parcel E-2 (up to 16 feet deep), with disposal at an approved off-site landfill. In addition, the entire parcel would be scanned for radioactivity to a depth of 1 foot, and radiological contamination near the ground surface would also be excavated and disposed of at one or more approved off-site landfills, as appropriate. Excavation would also be performed in the Panhandle Area to build new wetlands (both tidal and freshwater), and the excavated material would be screened to remove radiological contamination before placing it elsewhere on Parcel E-2. A minimum 2-feet-thick soil cover would be placed over all of Parcel E-2, and a protective liner, consisting of a geomembrane with an overlying geocomposite drainage layer, would be placed under the soil cover in all areas except the new tidal wetlands (the soil cover in the wetlands would be 4-feet-thick) to minimize water seeping into the contaminated material. Alternative 3 would include elements to control landfill gas and limit the flow of contaminated groundwater to San Francisco Bay.
- **Alternative 4 – Contain Solid Waste, Soil, Sediment, and Groundwater with Hot Spot Removal (including monitoring, institutional controls, and lined freshwater wetlands):** This alternative includes the same elements as Alternative 3, but includes removal of all hot spots and additional elements to contain groundwater. A total of 26,700 cubic yards of waste, soil, and sediment would be removed from Parcel E-2 (up to 16 feet deep) and disposed of at one or more approved off-site landfills, as appropriate. This is an additional 11,200 cubic yards compared to Alternative 3. Alternative 4 would also involve building a below-ground barrier near San Francisco Bay to better limit the flow of contaminated groundwater to the bay.
- **Alternative 5 – Contain Solid Waste, Soil, Sediment, and Groundwater with Hot Spot Removal (including monitoring, institutional controls, and unlined freshwater wetlands):** This alternative would have the same components as Alternative 4, but would include restoration of freshwater wetlands without a liner.

Alternatives 2, 3, 4, and 5 would each include the following additional components that are needed to meet the RAOs for radioactively contaminated media:

- Removal and remediation of sanitary sewer, storm drain, and septic sewer lines that extend into the East Adjacent Area but are located outside of the IR Site 01/21 boundary (see [Figure 3](#))
- Removal and remediation of the ship-shielding berm in the Panhandle Area
- Final radiological surveys of the excavated subgrade of Parcel E-2 prior to backfilling with soil meeting the radiological acceptance criteria

Following completion of the final radiological survey of the excavated subgrade, Alternatives 2, 3, 4, and 5 would each include installation of a demarcation layer within the IR Site 01/21 and 02 boundaries (see [Figure 3](#)) to identify remaining radiological hazardous substances at depth, prior to backfilling with clean imported soil. The demarcation layer would consist of a permeable geosynthetic material and magnetic marking tape to ensure proper identification of the bottom of the soil cap. Institutional controls, consisting of land use and activity restrictions, would be implemented to prevent exposure to potential residual contamination in soil left in place and to preserve the integrity of the soil cap.

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Alternatives 2, 3, 4, and 5 would each include monitoring and maintenance that would be performed as long as necessary to protect human health and the environment.

2.8.2. Comparative Analysis of Alternatives

A comparative analysis of alternatives with respect to the [nine evaluation criteria](#)⁽⁵³⁾ is provided below. Table 9 provides a relative ranking of the alternatives.

Table 9. Relative Ranking of Remedial Alternatives

CERCLA Criteria	1 No Action	2 Excavate and Dispose of Solid Waste, Soil, and Sediment (including monitoring, institutional controls, and unlined freshwater wetlands)	3 Contain Solid Waste, Soil, and Sediment with Hot Spot Removal (including monitoring, institutional controls, and lined freshwater wetlands)	4 Contain Solid Waste, Soil, Sediment, and Groundwater with Hot Spot Removal (including monitoring, institutional controls, and lined freshwater wetlands)	5 ^a Contain Solid Waste, Soil, Sediment, and Groundwater with Hot Spot Removal (including monitoring, institutional controls, and unlined freshwater wetlands)
Threshold Criteria					
Overall Protection of Human Health and the Environment	No	Yes	Yes	Yes	Yes
Compliance with ARARs	N/A	Yes	Yes	Yes	Yes
Balancing Criteria					
Long-Term Effectiveness and Permanence					
Reduction in Toxicity, Mobility, or Volume Through Treatment					
Short-Term Effectiveness					
Implementability					
Present Worth Cost (\$M)	0	351.5	78.4	86.6	86.7
Modifying Criteria					
State Acceptance					
Community Acceptance					

Notes: Fill symbol by quarters from open (poor) to full (excellent).

a = Indicates preferred alternative

ARARs = applicable or relevant and appropriate requirements

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

Threshold Criteria

Overall Protection of Human Health and the Environment. Alternatives 2, 3, 4, and 5 provide adequate protection of human health and the environment, thereby satisfying this threshold criterion and making these alternatives eligible for selection as the final remedial action. Alternative 1, the “no action” alternative, would not provide adequate protection of human health and the environment and is not eligible for selection as the final remedial action.

Compliance with ARARs. Alternatives 2, 3, 4, and 5 comply with state and federal ARARs, thereby satisfying this threshold criterion and making these alternatives eligible for selection as the final remedial action. ARARs do not apply to the no-action alternative.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Alternatives 2, 3, 4, and 5 each would be effective in the long-term. Alternative 2 would be most effective in the long-term because waste, soil, and sediment posing an unacceptable risk would be excavated and moved to another landfill. Alternatives 3, 4, and 5 would each be effective in the long-term because the hot spot areas would be removed and the final soil cover, protective liner, and control systems (for landfill gas and groundwater) would protect people and wildlife from being exposed to remaining contamination. The final cover, liner, and control systems would be maintained as long as contamination that could pose an unacceptable risk remains at the site. Alternatives 4 and 5 each include additional actions (additional excavation and installation of the below-ground barrier near San Francisco Bay) that would make them more effective in the long-term when compared with Alternative 3.

Reduction in Toxicity, Mobility, or Volume through Treatment. Alternatives 2, 3, 4, and 5 would perform equally in the way they reduce the toxicity, mobility, and volume of contaminants through treatment. These alternatives focus on removing and/or containing contaminants at Parcel E-2 and do not involve a significant amount of treatment.

Short-Term Effectiveness. Because of its invasive nature, Alternative 2 would pose more short-term risks to site workers and the surrounding community than the containment remedies (Alternatives 3, 4, and 5). These risks could include exposure to dust, noise, contaminated material, objectionable odors, and increased construction traffic. Alternative 2 is estimated to span a 4-year period, during which excavation and disposal of solid waste, soil, and sediment would take place. This period is twice as long as the estimated 2-year construction period to implement Alternatives 3, 4, or 5, which involves construction of a cap and its associated control systems. Alternatives 3, 4, and 5 would also require less disruption of in-place solid waste, soil, and sediment than the excavation remedy. Based on these factors, the short-term effectiveness of Alternative 2 is deemed to be substantially lower than Alternatives 3, 4, and 5 (the containment alternatives), which are expected to have moderate to high short-term effectiveness. Alternative 1 would have the highest relative short-term effectiveness because it would not involve remediation activities that might pose risks to the community, workers, or the environment.

Implementability. Alternative 2 presents numerous technical barriers that must be overcome for successful implementation because of the size and scale of the proposed excavation, thus the implementability of this remedy is lower than Alternatives 3, 4, and 5. Various controls would need to be implemented to minimize acute risks to site workers associated with Alternative 2. The massive scale of the excavation effort, coupled with the heterogeneous site conditions, make such controls difficult to implement. In contrast, the technologies for constructing Alternatives 3, 4, and 5 are proven and accepted technologies. Based on these factors, the implementability of Alternatives 3, 4, and 5 far exceeds that of

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Alternative 2, which has a low implementability. The no action alternative (Alternative 1) would have the highest relative implementability because no resources are required to implement this alternative and no known administrative considerations would affect its overall implementability.

Cost. Alternative 2 is the most costly (\$351.5 million) primarily because it includes the excavation and off-site disposal of over 1.1 million cubic yards of solid waste, soil, and sediment. In comparison, Alternatives 3, 4, and 5 have more moderate costs (ranging from \$78.4 to 86.7 million) for remedial construction and long-term operation, maintenance, and monitoring. Alternative 1 requires no action; therefore, no costs are associated with this alternative.

Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. The State of California concurs with the Navy's selected remedial alternative (Alternative 5).

Community Acceptance. Community acceptance is evaluated based on comments received from the public during the public comment period for the proposed plan. The proposed plan, which identified Alternative 5 as the preferred remedial alternative, was presented to the community and discussed during a public meeting on September 20, 2011. Comments were also gathered during the public comment period from September 7 through November 21, 2011. In general, public comments expressed a preference for Alternative 2 and concerns regarding the long-term effectiveness of Alternatives 3, 4, and 5. However, segments of the community, represented by the former San Francisco Redevelopment Agency and the Mayor's Hunters Point Shipyard Citizens Advisory Committee, as well as a number of engaged residents who live in close proximity to HPNS, have expressed their support of Alternatives 4 and 5. [Attachment 3](#), the responsiveness summary, of this ROD addresses the public's comments and concerns about the selected remedial alternative at Parcel E-2 (Alternative 5). In addition, a group of technical experts, which was hired by the advisor of EPA's Technical Assistance Grant (TAG) for HPNS, performed an independent review of the draft ROD and other CERCLA documents for Parcel E-2 and provided input regarding the appropriateness of the selected remedy for Parcel E-2. [Attachment 4](#) compiles the input and recommendations from the technical experts and provides the corresponding responses from the Navy. In general, the technical experts concluded that the Navy has collected sufficient information regarding the nature and extent of contamination at Parcel E-2 and that the selected remedy should protect human health and the environment in accordance with regulatory standards. Additional information regarding the Navy's community participation efforts for Parcel E-2 is provided in [Section 2.10](#).

2.9. SELECTED REMEDY

2.9.1. Rationale for Selected Remedy

The selected remedy for Parcel E-2 is Alternative 5, Contain Solid Waste, Soil, Sediment, and Groundwater with Hot Spot Removal (including monitoring, institutional controls, and unlined freshwater wetlands). The remedy was selected based on an evaluation of the remedial alternatives, as described in [Section 2.8](#), relative

to the nine evaluation criteria. The selected remedy complies with the two threshold criteria, and provides the best balance of tradeoffs with respect to the five balancing criteria. The Navy's evaluation of the two modifying criteria did not warrant changes to the preferred alternative published in the proposed plan (Alternative 5). The State of California, through DTSC and the Water Board, and segments of the community, represented by the former San Francisco Redevelopment Agency and Mayor's Hunters Point Shipyard Citizens Advisory Committee, support Alternative 5. As detailed in [Attachment 3](#), the information presented by members of the community that do not support Alternative 5 does not justify modification of Alternative 5, or selection of a different alternative, based upon the community acceptance criteria. In addition, as detailed in [Attachment 4](#), a group of independent technical experts agreed with the Navy's determination that Alternative 5 would protect human health and the environment. The remedy will effectively reduce site risks by removing significant amounts of contaminants and safely containing the remaining material. The cover, landfill gas controls, and groundwater controls will prevent contact with hazardous materials at levels that might pose an unacceptable risk. The selected remedy will be designed to address potential sea level rise, erosion, and earthquakes and will meet the standards used at other landfills nationwide. In addition, the selected remedy will be subject to statutory reviews every 5 years, pursuant to CERCLA, to ensure that it remains protective of human health and the environment. The five-year reviews will consider multiple technical factors, including but not limited to potential sea level rise, erosion, and earthquakes. The selected remedy allows the property to be used in the future in a manner consistent with the 2010 amended Redevelopment Plan and includes monitoring and maintenance that would be performed as long as necessary to protect human health and the environment.

The Navy's selection of Alternative 5 is consistent with EPA's recommendation that containment actions are typically the best alternative for large landfill sites (greater than 10 acres) instead of removal or treatment actions. As described in [Sections 2.3 and 2.8](#), the Navy determined that the Parcel E-2 Landfill has been adequately characterized and meets all of the criteria specified in EPA's [presumptive remedy guidance](#)⁽⁴⁷⁾. However, the Navy's evaluation has exceeded the requirements of the presumptive remedy guidance by evaluating complete excavation of the landfill in the FS (Alternative 2) to explain the relative risks of that alternative compared to the containment alternatives (Alternatives 3, 4, and 5), thereby supporting the community's review of potential remedial alternatives for Parcel E-2.

2.9.2. Description of Selected Remedy

The selected remedy for Parcel E-2 consists of three primary components: (1) excavation of contaminated soil, sediment, and debris; (2) containment of remaining contamination; and (3) monitoring, maintenance, and institutional controls to protect human health and the environment and to ensure the integrity of the remedial action. The following sections describe the components of the selected remedy, which will be [further developed in the RD](#)⁽⁵⁴⁾.

2.9.2.1. Excavation of Soil, Sediment, and Debris

The selected remedy consists of removing nearshore and upland hot spots that pose a significant risk to humans and wildlife ([Figure 12](#)), with disposal at one or more approved off-site landfills, as appropriate,

and backfilling of the excavations with clean soil. The hotspot excavations will generally not extend deeper than 10 feet bgs, consistent with the maximum depth evaluated in the HHRA; however, excavations at select nearshore hot spots may extend as deep as 16 feet bgs if necessary to remove continuing sources to groundwater contamination, and in accordance with performance criteria to be provided in the RD. In addition to identifying future nearshore hot spots to be addressed during the remedial action, [Figure 12](#) also shows several nearshore and upland hot spots that are currently being excavated pursuant to the Phase 2 TCRA Action Memorandum for the PCB Hot Spot Area. The excavation areas close to the Phase 1 excavation at the PCB Hot Spot Area, as discussed in [Section 2.6](#), may contain principal threat wastes. The Phase 2 TCRA at the PCB Hot Spot Area is ongoing, and post-excavation results are not yet available at the date of ROD signature. Accordingly, the excavation to achieve hot spot goals (see [Table 4](#)) will be completed as a remedial action pursuant to this ROD. The RD will analyze the conditions after the TCRA, and will specify the additional hot spot removal necessary to meet the hot spot goals.

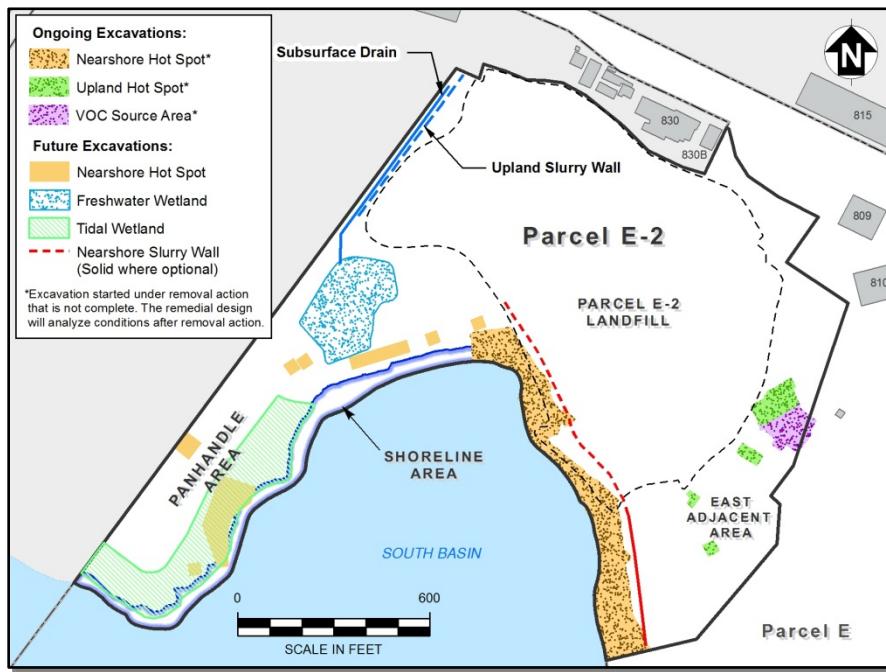


Figure 12. Hot Spot Excavations and Groundwater Containment Features

The RI/FS Report estimated the hotspot excavations to comprise 33,500 cubic yards of waste, soil, and sediment; however, this estimated volume has increased because of the site conditions encountered during the Phase 2 TCRA at the PCB Hot Spot Area. The lateral and vertical extent of hot spots would be refined through pre-excavation characterization to be performed during the RD. Following excavation, confirmation samples would be collected for analysis to verify that residual chemical concentrations were less than the hot spot goals. Upon receipt of acceptable confirmation sampling results, the excavations would be backfilled with clean imported soil that meets acceptance criteria (to be specified in the RD). Upon completion of excavation and achievement of the hot spot goals pursuant to the TCRA Action

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Memorandum and the ROD, the Navy will construct the cover pursuant to the remedy selected in the ROD in order to achieve the final remediation goals through breaking the pathway of potential exposure.

Prior to constructing the cover, additional soil, sediment, and debris would be excavated to build **new wetlands**⁽⁵⁵⁾ in the Panhandle Area, and to build a rock revetment structure in the Shoreline Area ([Figure 13](#)). The wetlands are not required to prevent exposure to contaminants, but are being created to offset the loss of wetlands at Parcel E-2 and other areas at HPNS. The Panhandle Area is the best location to create wetlands at HPNS because of its location along the shore of the South Basin. A rock revetment structure, consisting of large rocks placed on the shoreline slope, is needed to prevent erosion and protect the edge of the covered upland area.

The selected remedy would include radiological screening to be performed in conjunction with the proposed excavation activities, as described below.

- Soil, sediment, and debris excavated at nearshore and upland hot spots (see [Figure 12](#)) would be screened to identify radiological contamination exceeding the remediation goals (see [Table 6](#)). Radiologically contaminated soil, sediment, or debris identified during the screening process would be removed and disposed of at one or more approved off-site landfills, as appropriate. Following the radiological screening process, the remaining material from the hot spots would be disposed of at one or more approved off-site landfills.
- Soil, sediment, and debris excavated to build the wetlands and rock revetment structure (see [Figure 13](#)) would also be screened to identify radiological contamination exceeding the remediation goals (see [Table 6](#)). Radiologically contaminated material identified during the screening process would be removed and disposed of at one or more approved off-site landfills, as appropriate. Following the radiological screening process, the remaining material from the excavations shown on [Figure 13](#) would be placed elsewhere at Parcel E-2 (as a foundation layer for the final cover) because it contains low-level contamination that can be safely contained under the final cover.
- The existing soil cover at the Parcel E-2 Landfill (over the 14.5-acre interim landfill cap, see [Figure 7](#)) would be excavated to an appropriate depth (estimated to be 1 foot deep) and screened to identify radiological contamination exceeding the remediation goals (see [Table 6](#)). Radiologically contaminated soil identified during the screening process would be removed and disposed of at one or more approved off-site landfills, as appropriate. Following the radiological screening process, the remaining material from the existing soil cover would be placed elsewhere at Parcel E-2 as a foundation layer for the final cover.

Concurrent with the radiological screening of material excavated during the activities described above, the Navy would perform a final radiological surface survey throughout Parcel E-2 to identify and remove radiological contamination (exceeding the remediation goals in [Table 6](#)) to a depth of 1 foot (the maximum effective depth of the surface survey). Deeper soil excavation would be performed, if necessary, to ensure that the residual radiological risk at the final ground surface (following installation of a demarcation layer and soil cover) is acceptable. The residual radiological risk at the final ground surface (based on residential exposure) would be within the risk management range specified in the NCP (10^{-6} to 10^{-4}). In

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preparing the RD, the Navy would work closely with the regulatory agencies to develop specific protocols for determining when deeper soil excavation is needed to ensure that the residual radiological risk at the final ground surface is acceptable. In addition, the Navy would perform radiological risk modeling, in conjunction with the final radiological surveys, to verify that the residual radiological risk is acceptable.

In addition, the Navy has initiated a TCRA to remove radioactive contamination (containing ^{60}Co) pursuant to a TCRA Action Memorandum for the Ship-Shielding Area (see [Figure 7](#)). Consistent with the remediation approach described above, the TCRA at the Ship-Shielding Area will identify and remove radiological contamination (containing ^{60}Co) exceeding the remediation goal (see [Table 6](#)) to a depth of 1 foot. The TCRA at the Ship-Shielding Area is ongoing, and post-excavation results are not available at the date of ROD signature. The RD will analyze the conditions after the TCRA, and will specify the additional excavation to achieve the remediation goals for all ROCs (see [Table 6](#)); if required, additional excavation to achieve the remediation goals would be completed as a remedial action pursuant to this ROD. In addition, the selected remedy would include **removal of the sanitary sewer, storm drain, and septic sewer lines**⁽⁵⁶⁾ that extend into the East Adjacent Area but are located outside of the IR Site 01/21 boundary (see [Figure 3](#)), and removal of radiological contamination exceeding the remediation goals within the trenches.

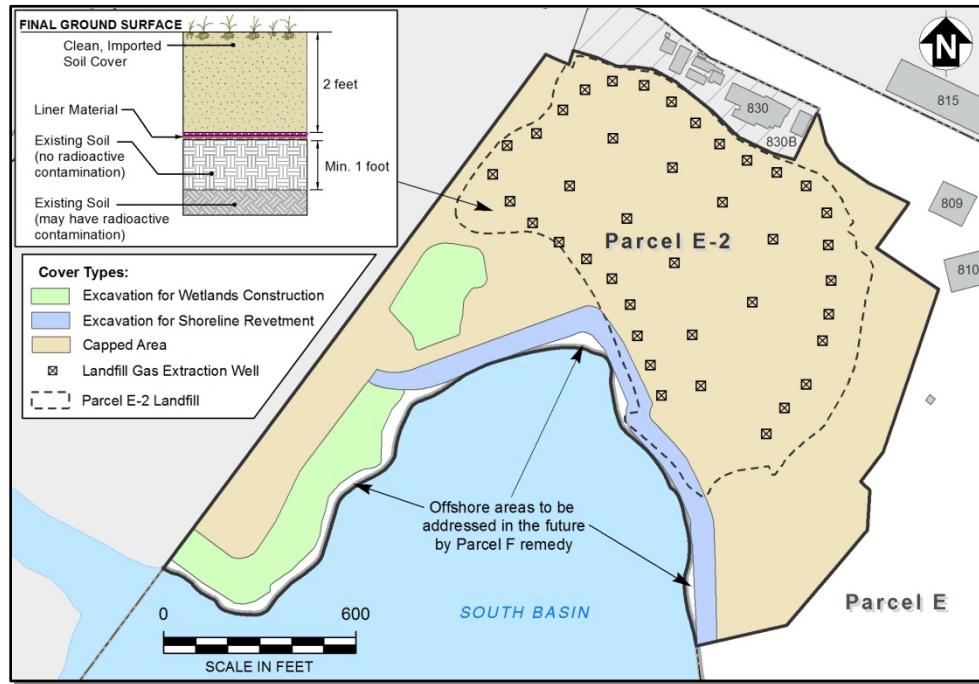


Figure 13. Excavation and Cover Plan

2.9.2.2. Containment of Remaining Contamination

Following completion of the final radiological survey and placement of radiologically screened material from the excavations shown on [Figure 13](#), a minimum 2-feet-thick soil cover would be placed over all of Parcel E-2, including a small portion of the Parcel E-2 Landfill that extends north onto property owned by

UCSF (see [Figure 2](#)). In addition, a protective liner, consisting of a geomembrane with an overlying geocomposite drainage layer, would be placed under the soil cover in all areas except the new wetlands. The protective liner will minimize water seeping into the contaminated material, deter animals from burrowing under the cover, and serve as a visual marker for the bottom of the cover. A liner would not be used in the new wetlands, so that they function more naturally. To prevent exposure to contaminated material, the soil cover in the new wetlands would be 4 feet thick. The new protective liner would be contiguous with the existing landfill cap; however, portions of the existing landfill cap would be removed to achieve the design elevations, and a new protective liner would be constructed in these areas.

In conjunction with installation of the protective liner, a demarcation layer would be installed within radiologically impacted portions of the East Adjacent Area and throughout the Parcel E-2 Landfill, Panhandle Area, and Shoreline Area to identify remaining radiological hazardous substances at depth. The demarcation layer would consist of a permeable geosynthetic material and magnetic marking tape placed at the bottom of the soil cover. A demarcation layer would also be installed under the 4-foot-thick cover in the new wetlands. As described in [Section 2.9.2.1](#), the Navy would perform radiological risk modeling, using data from the final radiological surveys, to verify that residual radiological risk at the final ground surface (following installation of a demarcation layer and soil cover) is within the risk management range specified in the NCP (10^{-6} to 10^{-4}).

The selected remedy would expand the existing [landfill gas controls](#)⁽⁵⁷⁾, which focus on the northern edge of the Parcel E-2 Landfill, by actively removing and treating gas from the entire Parcel E-2 Landfill ([Figure 13](#)). The existing landfill gas controls have been effective as an interim measure in preventing off-site migration of landfill gases from Parcel E-2; however, the expanded system is necessary to effectively control landfill gas in the long-term. Extracted landfill gas would be treated by an enclosed flare and/or adsorbent material (such as a charcoal filter). An enclosed flare involves controlled burning of methane and low levels of other organic chemicals. An enclosed flare is the most common technology for treating landfill gas, and it limits the amount of methane (a greenhouse gas) that is released to the atmosphere. Adsorbent material is designed to capture NMOCs but not methane. The Navy currently uses a charcoal filter to capture NMOCs from the landfill gas control system. The Navy will further evaluate the treatment options during the design and will consult with the regulatory agencies and the community to determine which treatment option(s) will be used.

Flow of contaminated groundwater into San Francisco Bay would be limited by installing a [below-ground barrier and drain along the western boundary](#)⁽⁵⁸⁾ ([Figure 12](#)). This barrier and drain would divert groundwater flow into the landfill to the new freshwater wetland. Water entering the freshwater wetlands will be monitored to ensure compliance with the surface water RAO specified in [Section 2.7](#), as well as applicable freshwater water quality objectives (see [Attachment 5](#)). In addition, a [below-ground barrier would be installed near the shoreline](#)⁽⁵⁹⁾, and groundwater quality will be monitored at an appropriate location near the barrier (to be determined in the RD). The [groundwater would be hydraulically controlled if necessary](#)⁽⁶⁰⁾ to satisfy pertinent ARARs (see [Attachment 5](#)). Specifically, hydraulic control would be performed if necessary to keep contaminants from flowing into San Francisco

Bay at concentrations greater than the corresponding [water quality criteria](#)⁽⁴⁵⁾ for aquatic wildlife (to comply with the surface water RAO specified in [Section 2.7](#)). The RD will develop specific monitoring criteria for A-aquifer groundwater that address the potential risk to aquatic wildlife in San Francisco Bay.

The selected remedy includes a preliminary plan, developed with input from various technical experts that would [control soil movement during the maximum probable earthquake](#)⁽⁶¹⁾ (MPE). If present over a large enough area and depth, certain types of soil (sands and silts) can liquefy during an earthquake and cause the ground surface to move. The Navy studied the soil in and around the Parcel E-2 Landfill and found that most soil would not liquefy even during the MPE. Additionally, the soil layers that might liquefy would be controlled through proper design and construction of the final cover using methods that are well established for sites in the San Francisco Bay area. The Navy will further evaluate, including consulting with other technical experts, this very important part of the design to make sure that the final cover is built to withstand the appropriate design earthquake and comply with numerous other regulatory requirements for landfill covers.

Parcel E-2 is planned for open space that includes parks and restored wetlands. The covered upland area of Parcel E-2 would be accessible to pedestrians and may include part of the regional trail planned for the edge of San Francisco Bay. The new tidal wetlands would be combined with the planned wetland restoration at the non-Navy, California State Parks property immediately west of Parcel E-2 along Yosemite Slough. The shorelines adjacent to the upland area and the new tidal wetlands would require protection to make sure people and wildlife are not exposed to contaminated soil that is not excavated. The new tidal wetlands would have gradual slopes that can be protected by natural soil and vegetation. The upland area would have steeper slopes that require stronger protection with a rock revetment structure ([Figure 13](#)). The top of the revetment would extend high enough to protect against flooding from a [potential rise in sea level](#)⁽⁶²⁾, but would not obstruct pedestrians' views of San Francisco Bay because trails would be placed at about the same height as the top of the revetment. The bottom of the revetment would stop near the mean tide line, and the areas exposed during low tide would be natural sediment.

2.9.2.3. Monitoring, Maintenance, and Institutional Controls

The selected remedy includes the following monitoring and maintenance activities that would be performed as long as necessary to protect human health and the environment and to comply with the substantive provisions of pertinent state and federal ARARs (see [Attachment 5](#)):

- Groundwater monitoring will be performed, consistent with the requirements of Cal. Code Regs. tit. 22 § 66264.100(d) and § 66264.310(b)(3), to verify that chemical concentrations in groundwater do not exceed concentrations designated by the RAOs at the point of compliance.
- Landfill gas monitoring will be performed to meet the RAOs and to demonstrate compliance with Cal. Code Regs. tit. 27 § 20917 through § 20934.

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- Stormwater and erosion controls will be installed and maintained as required under Cal. Code Regs. tit. 27 § 20365(c) and (d), and stormwater discharges will be monitored as required under Cal. Code Regs. tit. 22 § 66264.97(c)(1) and (c)(2)(B).
- The cover will be inspected and maintained to ensure its integrity as required under Cal. Code Regs. tit. 27 § 21180(a).

The long-term monitoring and maintenance program will be detailed in the post-closure operation and maintenance plan (OMP) for Parcel E-2, consistent with content requirements as provided in Cal. Code Regs. tit. 27 § 21800(c), and submitted for review and approval by EPA, DTSC, and the Water Board in conjunction with the RD. Regulatory agency oversight will continue during long-term operation and maintenance of the selected remedy. In addition, the selected remedy will be subject to statutory reviews every 5 years pursuant to CERCLA to ensure that it remains protective of human health and the environment.

The Navy would also implement institutional controls, which are legal and administrative mechanisms for the continued protection of human health and the environment. In Parcel E-2, the objectives of the institutional controls are to implement land use and activity restrictions that are used to limit the exposure of future landowner(s) or user(s) of the property to hazardous substances present on the property and in groundwater, and to ensure the integrity of the remedial action, including any current or future remedial or monitoring systems such as monitoring wells, landfill gas monitoring and collection systems, and subsurface groundwater control barriers. Institutional controls are required on a property where the selected remedial action results in contamination remaining at the property above levels that allow for unlimited use and unrestricted exposure. The institutional controls for Parcel E-2 will restrict the development, land use, and activities on Parcel E-2 property as described in this ROD. These institutional controls will be maintained until the concentrations of hazardous substances in soil and groundwater are at such levels to allow for unrestricted use and exposure. Implementation of Parcel E-2 institutional controls includes requirements for monitoring and inspections, and reporting to ensure compliance with land use or activity restrictions. Figure 14 presents the area requiring institutional controls (ARIC) for nonradioactive

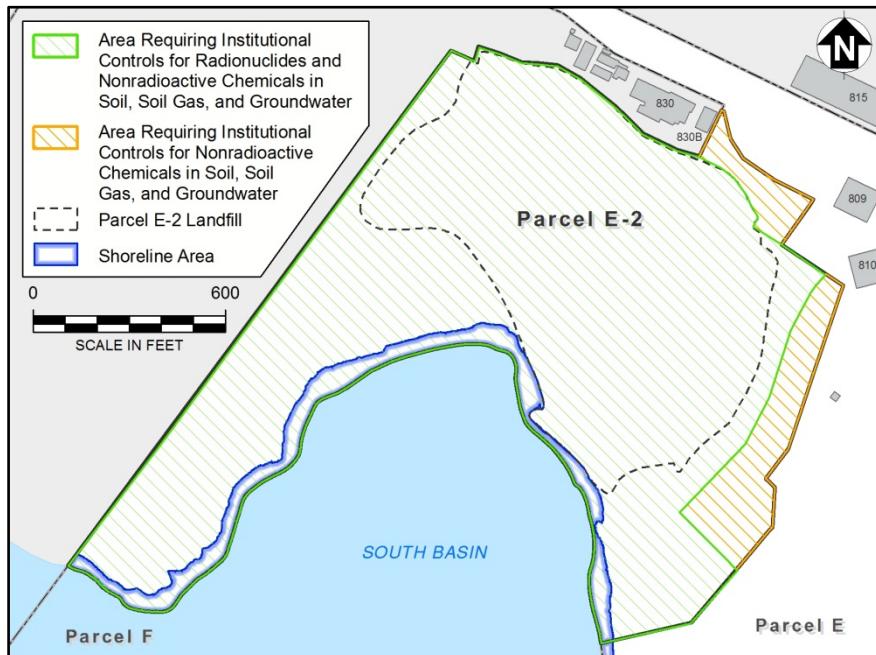


Figure 14. Area Requiring Institutional Controls

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chemicals, which comprises all of Parcel E-2 including a small portion of the Parcel E-2 Landfill that extends north onto property owned by UCSF (see [Figure 2](#)). [Figure 14](#) also identifies the ARIC for radionuclides (green pattern on [Figure 14](#); also referred to as the radiological ARIC), which consists of all of Parcel E-2 except for portions of the East Adjacent Area located outside of the IR Site 01/21 boundary (see [Figure 3](#)). Outside of the radiological ARIC, potential radioactive contamination exceeding the remediation goals would be removed, thus these areas would not require institutional controls regarding exposure to radioactivity.

The Navy has determined that it will rely on proprietary controls in the form of environmental restrictive covenants as provided in the “Memorandum of Agreement between the United States Department of the Navy and the California Department of Toxic Substances Control” and attached covenant models (hereinafter referred to as the “Navy/DTSC MOA”).

More specifically, land use and activity restrictions will be incorporated into two separate legal instruments as provided in the Navy/DTSC MOA:

1. Restrictive covenants included in one or more Quitclaim Deeds from the Navy to the property recipient.
2. Restrictive covenants included in one or more “Covenant to Restrict Use of Property” entered into by the Navy and DTSC as provided in the Navy/DTSC MOA and consistent with the substantive provisions of Cal. Code Regs. tit. 22 § 67391.1.

The “Covenant(s) to Restrict Use of Property” will incorporate the land use and activity restrictions into environmental restrictive covenants that run with the land and that are enforceable by DTSC against future transferees. The Quitclaim Deed(s) will include the identical land use and activity restrictions in environmental restrictive covenants that run with the land and that will be enforceable by the Navy against future transferees.

The land use and activity restrictions in the “Covenant(s) to Restrict Use of Property” and Quitclaim Deed(s) shall be further defined in the land use control remedial design (LUC RD) report that would be prepared by the Navy and reviewed and approved by the other FFA signatories. The LUC RD report shall be referenced in the applicable Covenant to Restrict Use of Property and Deed. A risk management plan (RMP) may be prepared by the CCSF and approved by the FFA signatories that may set forth certain requirements and protocols used to conduct restricted activities.

In addition to being set forth in the “Covenant(s) to Restrict Use of Property” and Quitclaim Deed(s) as described above, restrictions applied to specified portions of the property will be described in findings of suitability to transfer. The Navy will also access the portion of the Parcel E-2 Landfill extending onto UCSF property (as identified on [Figure 8](#)) to perform the remedial action pursuant to easements, or another appropriate legal mechanism, entered into with UCSF. In addition, the Navy and regulatory agencies will also control use, through easements or another appropriate legal mechanism entered into with UCSF, of the portion of the Parcel E-2 Landfill extending onto UCSF property to ensure that its

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future use is compatible with the selected remedy. Specific requirements for accessing or controlling use of the portion of the Parcel E-2 Landfill extending onto UCSF property will be specified in the LUC RD report.

Access

The Deed and Covenant shall provide that the Navy and other FFA signatories, where applicable, and for CDPH in the radiological ARIC ([Figure 14](#)), and their authorized agents, employees, contractors, and subcontractors shall have the right to enter upon HPNS Parcel E-2 to conduct investigations, tests, or surveys; inspect field activities; or construct, operate, and maintain any response or remedial action as required or necessary under the cleanup program, including but not limited to monitoring wells, pumping wells, treatment facilities, and cap and containment systems.

Implementation

The Navy shall address and describe implementation and maintenance actions for institutional controls, including periodic inspections and reporting requirements, in the preliminary and final RD reports to be developed and submitted to the other FFA signatories for review pursuant to the FFA (see “Navy Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions” attached to January 16, 2004 Department of Defense memorandum titled “Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] Record of Decision [ROD] and Post-ROD Policy”). The preliminary and final RD reports are primary documents as provided in Section 7.3 of the FFA.

The Navy is responsible for implementing, maintaining, reporting on, and enforcing institutional controls. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for remedy integrity.

Land Use and Activity Restrictions that Apply throughout Parcel E-2

The following paragraphs describe the institutional control objectives to be achieved through land use and activity restrictions throughout Parcel E-2 to ensure that any necessary measures to protect human health and the environment and the integrity of the remedy have been undertaken.

Land Use Restrictions

The Successor Agency to the San Francisco Redevelopment Agency has designated HPNS Parcel E-2 for open space reuse, consistent with the [2010 amended Redevelopment Plan](#)⁽²²⁾. Parcel E-2 shall be restricted to open space and recreational uses, unless written approval for other uses is granted by the FFA signatories. In addition, the following land uses are specifically prohibited in all Parcel E-2 areas, unless written approval for such uses is granted by the FFA signatories, in accordance with the Covenant(s) to Restrict Use of the Property, Quitclaim Deed(s), LUC RD report, and Parcel E-2 RMP, if deemed necessary:

- a. A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation.
- b. A hospital for humans.
- c. A school for persons under 21 years of age.
- d. A daycare facility for children.
- e. Any permanently occupied human habitation, including those used for commercial or industrial purposes.

General Activity Restrictions

The following activities are restricted throughout HPNS Parcel E-2 and must be conducted in accordance with the “Covenant(s) to Restrict Use of Property,” Quitclaim Deed(s), the OMP, the LUC RD report and, if deemed necessary, the Parcel E-2 RMP and any other work plan or document approved in accordance with these referenced documents:

- a. “Land-disturbing activity,” which includes but is not limited to (1) excavation of soil; (2) construction of roads, utilities, facilities, structures, and appurtenances of any kind; (3) demolition or removal of “hardscape” (for example, concrete roadways, parking lots, foundations, and sidewalks); (4) any other activity that involves movement of soil to the surface from below the surface of the land; and (5) any other activity that causes or facilitates the movement of groundwater known to be contaminated with radionuclides or nonradioactive chemicals. Land-disturbing activities are not intended to include placement of additional clean, imported fill on top of the soil cover that the Navy will construct at HPNS Parcel E-2.
- b. Alteration, disturbance, or removal of any component of a response or cleanup action (including but not limited to pump-and-treat facilities, revetment walls and shoreline protection, and soil cap/containment systems); groundwater extraction, injection, and monitoring wells and associated piping and equipment; or associated utilities.
- c. Extraction of groundwater and installation of new groundwater wells.
- d. Removal of or damage to security features (e.g., locks on monitoring wells, survey monuments, fencing, signs, or monitoring equipment and associated pipelines and appurtenances).

In addition, the following activities are prohibited throughout HPNS Parcel E-2:

- a. Growing vegetables or fruits in native soil for human consumption.
- b. Use of or access to groundwater.

Additional Activity Restrictions Related to Radionuclides at Parcel E-2

Exposure to radionuclides in the radiological ARIC ([Figure 14](#)) would be prevented by three separate components: (1) an engineered cover, consisting of clean imported fill and (in all areas outside of the future wetlands) a low hydraulic conductivity layer, to provide adequate shielding against residual radioactivity; (2) permeable geosynthetic fabric to serve as a “demarcation layer” between soil cover and underlying soil with residual radioactivity; and (3) institutional controls to implement land use and

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activity restrictions necessary to limit the exposure to radiological hazardous substances and to ensure the integrity of the remedial action.

In addition to the land use and activity restrictions specified above, the following activity restriction would apply in the radiological ARIC.

- a. Land-disturbing activities within the radiological ARIC, as defined above and including installation of water lines, storm drains, or sanitary sewers, below the demarcation layer, are strictly prohibited unless approved in writing by the FFA signatories and the California Department of Public Health (CDPH). Any proposed land-disturbing activity within the ARIC for radionuclides shall be required to be described in a work plan that will include but not be limited to a radiological work plan, the identification of a radiological safety specialist, a soil management plan, soil sampling and analysis requirements, and a plan for off-site disposal of any excavated radionuclides by the transferee in accordance with federal and state law. This work plan must also specify appropriate procedures for the proper identification and handling of material potentially presenting an explosive hazard. This work plan must be submitted to and approved in writing by the FFA signatories and CDPH in accordance with procedures (including dispute resolution procedures) and timeframes that will be set forth in the OMP and LUC RD report.
- b. Following implementation of an approved land-disturbing activity within the radiological ARIC, the integrity of the cover/cap must be restored upon completion of excavation as provided in the OMP, LUC RD report, or similar document. A completion report describing the details of the implementation of the work plan, sampling and analysis (if required), off-site disposal (if required), and the restoration of the integrity of the cover/cap must be submitted to and approved in writing by the FFA signatories and CDPH in accordance with procedures (including dispute resolution procedures) and timeframes that will be set forth in the OMP and LUC RD report.
- c. For land-disturbing activities, as defined above and including installation of water lines, storm drains, or sanitary sewers, above the demarcation layer, the LUC RD report, the OMP, or, if deemed necessary, the RMP or a project-specific work plan will list the procedures for ensuring that the cover is not disturbed or breached. The specific design of the cover shall be agreed to in the RD. Installation of water lines, storm drains, or sanitary sewers in any additional clean, imported fill placed on top of the soil cover that the Navy has constructed at the Property is not intended to be restricted if the property owner demarcates the interface between the pre-existing cover and any new imported soil.

At the time of transfer, the areas that require this restriction will be surveyed to define the legal metes and bounds for inclusion in the property transfer documents. No variance or exemption from this restriction shall be allowed unless written approval is provided by the FFA signatories and CDPH. The OMP or LUC RD report shall address any necessary additional soil and radiological management requirements, for example inspections, monitoring, and reporting requirements for portions of Parcel E-2 in the radiological ARIC.

Additional Activity Restrictions Related to Subsurface Gas at Parcel E-2

Any proposed construction of enclosed structures must be approved in accordance with the Covenant to Restrict Use of the Property, Quitclaim Deed(s), the LUC RD report and, if deemed necessary, the Parcel E-2 RMP prior to conducting such activities within the ARIC (Figure 14) to ensure compliance with the substantive provisions of Cal. Code Regs. tit. 27 § 21190(a), (b), (d), (e), (f) and (g), which require that postclosure land uses be designed and maintained to protect health and safety in areas affected by landfill gas migration. In particular, Cal. Code Regs. tit. 27 § 21190(g) specifies design and construction standards for “all on site construction within 1,000 feet of the boundary of any disposal area.” The Navy has determined that the substantive provisions of Cal. Code Regs. tit. 27 § 21190(g) are relevant and appropriate for future construction within the Parcel E-2 boundary, including the portion of the Parcel E-2 Landfill that extends onto UCSF property, because Parcel E-2 may be affected by subsurface gas emanating from the Parcel E-2 Landfill. However, these provisions are not relevant and appropriate to future off-site construction beyond the Parcel E-2 boundary because these areas are not affected by subsurface gas emanating from the Parcel E-2 Landfill. The interim gas control system and ongoing monitoring program are effectively controlling the migration of hazardous levels of landfill gas beyond the Parcel E-2 boundary. The permanent gas control system in the selected remedy would continue to control the migration of hazardous levels of landfill gas beyond the Parcel E-2 boundary.

Human health can be protected through engineered containment systems, such as landfill caps and gas control systems, or other design alternatives that meet the specifications set forth in the RD reports, the LUC RD report and, if deemed necessary, the Parcel E-2 RMP. The FFA signatories may modify the ARIC, which will initially include all of HPNS Parcel E-2, in response to further soil, vapor, and groundwater sampling and analysis that establishes that areas now included in the ARIC do not pose an unacceptable risk to human health.

2.9.3. Expected Outcomes of the Selected Remedy

Once the selected remedy has been implemented, risks to human health and the environment under the planned recreational use will be acceptable and the RAOs will be achieved. Excavation and off-site disposal of hot spots and radioactive contamination near the ground surface will reduce site risks, and the cover will prevent contact with remaining contamination that might pose an unacceptable risk. The liner will minimize water seeping into the contaminated material, deter animals from burrowing under the cover, and serve as a visual marker for the bottom of the cover. The landfill gas and groundwater controls will effectively limit the migration of hazardous chemicals at concentration that may pose an unacceptable risk. The selected remedy will take a relatively short period of time to implement and will use readily available technologies and labor. Following implementation, long-term monitoring and maintenance will ensure the continued protection of human health and the environment. In addition, institutional controls will restrict potential exposure to contaminated soil, sediment, landfill gas, and groundwater and the restrictions will be consistent with the planned future use of Parcel E-2.

2.9.4. Statutory Determinations

In accordance with the NCP, the selected remedy meets the following statutory determinations.

- **Protection of Human Health and the Environment** – The selected remedy will adequately protect human health and the environment by preventing exposure to COCs and COECs through the excavation of hot spots and radioactive contamination near the ground surface, installation and monitoring of a containment systems (including cover and landfill gas and groundwater controls), and the implementation of institutional controls.
- **Compliance with ARARs** – CERCLA § 121(d)(1) states that remedial actions on CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate. The selected remedy for Parcel E-2 will comply with the substantive provisions of the federal and state requirements identified as ARARs. The chemical-, location-, and action-specific ARARs for the selected remedy are summarized in [Attachment 5](#).
- **Cost-Effectiveness** – As specified in the NCP, the cost-effectiveness of a remedy is determined in two steps. First, the overall effectiveness of a remedial alternative is determined by evaluating the following three of the five balancing criteria: (1) long-term effectiveness and permanence; (2) reduction in toxicity, mobility, or volume through treatment; and (3) short-term effectiveness. The overall effectiveness is then compared to cost to determine whether a remedy is cost-effective. The selected remedy has a high overall effectiveness because, relative to the other remedial alternatives (most notably Alternative 2), it offers a high degree of long-term effectiveness in a manner that minimizes short-term risks. In contrast, the high degree of long-term effectiveness of Alternative 2 is offset by significant short-term risks. Reduction in toxicity, mobility, or volume through treatment is not a decisive factor because Alternatives 2, 3, 4, and 5 focus on removing and/or containing contaminants at Parcel E-2 and do not involve a significant amount of treatment. The selected remedy will provide high overall effectiveness proportional to its costs, as demonstrated by the improved overall effectiveness of Alternative 5 relative to Alternative 3 for a modest (approximately 10 percent) incremental cost increase. Therefore, the selected remedy is considered cost-effective. In contrast, Alternative 2 is not considered cost-effective because its lower overall effectiveness (relative to Alternative 5) is accompanied by a significant incremental cost increase (over 300 percent relative to Alternatives 3, 4, and 5).
- **Utilization of Permanent Solution and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable** – The Navy has determined that the selected containment remedy, combined with excavation of small quantities of more highly contaminated soil, represents the maximum extent to which permanent solutions and treatment are practicable at this site. The selected containment remedy (Alternative 5) provides the best balance of tradeoffs relative to the five balancing criteria: (1) long-term effectiveness and permanence; (2) reduction in toxicity, mobility, or volume through treatment; (3) short-term effectiveness; (4) implementability; (5) and cost. Alternative 5 provides a high degree of long-term effectiveness, although not as high as Alternative 2, because the hot spot areas would be removed and the final soil cover, protective liner, and control systems (for landfill gas and groundwater) would protect people and wildlife from being exposed to remaining contamination. Reduction in toxicity, mobility, or volume through treatment is not a decisive factor because

Alternatives 2, 3, 4, and 5 focus on removing and/or containing contaminants at Parcel E-2 and do not involve a significant amount of treatment. Alternative 5 provides the highest degree of short-term effectiveness and implementability because it uses proven and accepted technologies that can be implemented more quickly and readily than the other alternatives, most notably Alternative 2, thereby reducing the short-term risks to site workers and the surrounding community. Alternative 5 has comparable cost to Alternatives 3 and 4; Alternative 2 is significantly more expensive than Alternatives 3, 4, and 5. Relative to the two modifying criteria (state and community acceptance), Alternative 5 is accepted by the State of California and some segments of the local community; however, the overall community acceptance of Alternative 5 is poor because of the general preference for the more complete removal proposed under Alternative 2. In summary, Alternative 5 provides a combination of removal and containment that reduces risk sooner, is easier to implement and much more cost-effective than Alternative 2, and provides additional risk reduction as compared with Alternatives 3 and 4. The performance of Alternative 5 relative to the five balancing criteria, in addition to its acceptance by the state, outweigh the community's overall lack of acceptance for Alternative 5.

- **Preference for Treatment as a Principal Element** – The selected remedy does not satisfy the statutory preference for treatment⁵ as a principal element because there is no cost-effective means of treating the large quantity of low-level soil contamination throughout Parcel E-2 and the small quantities of principal threat wastes at the PCB Hot Spot Area cannot be treated in a cost-effective manner. Accordingly, none of the remedial alternatives proposed a significant amount of treatment. The principal threat wastes at the PCB Hot Spot Area are being excavated under a TCRA that is scheduled to be completed in 2012. The protective liner and below-ground barriers are expected to reduce the mobility of contamination, and natural attenuation mechanisms will reduce the toxicity, mobility, and volume of some contaminants.
- **Five-Year Review Requirements** – Statutory five-year reviews pursuant to CERCLA § 121 and the NCP will be conducted because the selected remedy will leave contamination in place at Parcel E-2 above levels that allow for unrestricted use and unlimited exposure. Five-year reviews for Parcel E-2 will follow the ongoing schedule of five-year reviews established for other remedies in place at HPNS.

2.9.5. Documentation of Significant Changes

The Proposed Plan and Draft ROD were released for public comment in September 2011 and March 2012, respectively. The documents identified Alternative 5 (involving the containment of solid waste, soil, sediment, and groundwater with hot spot removal) as the selected remedy for Parcel E-2. During the comment period on the Draft ROD, new information prompted the following changes:

⁵ As defined in the NCP (Title 40 Code of Federal Regulations § 300.5), “treatment technology” means any unit operation or series of unit operations that alters the composition of a hazardous substance or pollutant or contaminant through chemical, biological, or physical means so as to reduce toxicity, mobility, or volume of the contaminated materials being treated. Treatment technologies are an alternative to land disposal of hazardous wastes without treatment.

- **Boundary Change Between Parcels E and E-2** – Pursuant to the City and County of San Francisco’s [2010 amended Redevelopment Plan](#)⁽²²⁾, two small areas (less than 1 acre) in the East Adjacent Area were designated as part of the “Shipyard South Multi-Use District” and an adjacent roadway. The Shipyard South Multi-Use District may be used for recreational, industrial, and residential purposes, but these potential land uses were not anticipated during preparation of the RI/FS Report. The Navy, in consultation with the EPA, DTSC, the Water Board, and the City and County of San Francisco, concluded that a [boundary change between Parcels E and E-2](#)⁽²³⁾ was the most effective way to resolve this discrepancy. The revised boundary between Parcels E and E-2 results in the Shipyard South Multi-Use District no longer being located in Parcel E-2, and the planned reuse for Parcel E-2 is now limited to open space.
- **Revised Remediation Goal for ^{60}Co** – In planning the TCRA at the Ship-Shielding Area to address potential ^{60}Co contamination, the Navy identified that the remediation goal for ^{60}Co needed to be revised to support efficient laboratory gamma spectroscopy analysis of soil samples. As documented in the TCRA Action Memorandum for the Ship-Shielding Area, the Navy [revised the remediation goal for \$^{60}\text{Co}\$](#) ⁽¹⁹⁾ to 0.252 pCi/g (see [Table 6](#)). This activity level is adequately protective of human health and the environment.

The above listed changes are documented in this ROD pursuant to CERCLA § 117 and the NCP.

2.10. COMMUNITY PARTICIPATION

Community participation at HPNS includes public meetings, public information repositories, an IR Program website, newsletters and fact sheets, public notices, and site tours. The Community Involvement Plan for HPNS provides detailed information on community participation for the IR Program and documents interests, issues, and concerns raised by the community regarding ongoing investigation and cleanup activities at HPNS. The Navy held a community meeting on February 2, 2010, to solicit community input on updating the Community Involvement Plan for HPNS. The Navy used this input in preparing an update to the [Community Involvement Plan](#)⁽⁶³⁾, which was finalized in May 2011.

Starting in January 2010, the Navy began conducting bimonthly Community Technical Meetings to discuss the technical aspects of the CERCLA milestone documents with community members (and with participation from the Base Realignment and Closure [BRAC] Cleanup Team). Documents and relevant information relied upon in the remedy selection process are made available for public review in the public information repositories (listed at the end of this section) or on the [IR Program website](#)⁽⁶⁴⁾.

Community participation is also solicited through public mailings, including newsletters, fact sheets, public notices, and proposed plans, which are designed to broadly disseminate information throughout the local community. Public mailings for HPNS are sent to more than 2,000 groups and individuals that have added their names to the community mailing list, including residents in the local Hunters Point-Bayview community; city, state, and federal officials; regulatory agencies; and other interested groups and individuals. Previous updates and fact sheets have included general program information such as the status of environmental investigations and cleanup activities at each HPNS parcel. In addition, the Navy

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has held periodic site tours of HPNS to better explain the status of cleanup activities to interested community members.

For Parcel E-2, a significant effort was made to inform the public of the remedy proposed in the Proposed Plan and selected in this ROD. Prior to making the Proposed Plan available for public review, a public notice of the meeting and availability of documents was placed in the *San Francisco Chronicle* on September 4, 2011. Additional public notices were placed in the September 2011 editions of two publications (the *San Francisco Bayview* and the *Sun-Reporter*) in the local Hunters Point-Bayview community. The Proposed Plan, along with [two associated fact sheets](#)⁽⁶⁵⁾, was distributed to recipients on the community mailing list beginning on September 2, 2011. An online advertisement was also placed on the *San Francisco Bayview* website to direct users to the IR Program website, where electronic copies of the Proposed Plan, fact sheets, and the RI/FS Report were made available.

In accordance with CERCLA § 113 and § 117, the Navy provided a public comment period from September 7, 2011, to November 21, 2011, for the proposed remedial action described in the Proposed Plan for Parcel E-2. A public meeting to present the Proposed Plan was held from 6:00 to 9:00 p.m. on September 20, 2011. At the public meeting, the Navy gave presentations on the conditions at Parcel E-2, and the representatives from the Navy and regulatory agencies were available to answer questions. A [transcript of the public meeting](#)⁽⁶⁶⁾ prepared by a court reporter is part of the administrative record for this ROD and is available on the CD for this ROD. The initial public comment period was scheduled to end on October 24, 2011, but was extended to November 21, 2011, at the request of several community members. Additional public notices of the extension to the public comment period were placed in the *San Francisco Chronicle*, the *San Francisco Bayview*, and the *Sun-Reporter*. Responses to spoken comments received during the public meeting and written comments received during the public comment period are included in the Responsiveness Summary in [Section 3](#).

Key supporting documents that pertain to Parcel E-2 and a complete index of all Navy HPNS documents are available at the following information repositories:

San Francisco Main Library
100 Larkin Street
Government Information Center, 5th Floor
San Francisco, California 94102
Phone: (415) 557-4500

HPNS Office Trailer
690 Hudson Street
San Francisco, California 94124

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For access to the Administrative Record contact:

Naval Facilities Engineering Command Southwest
Attention: Diane Silva, Command Records Manager
2965 Mole Road, Building 3519
San Diego, CA 92136
Phone: (619) 556-1280

For additional information on the IR Program contact:

Mr. Keith Forman
HPNS BRAC Environmental Coordinator
BRAC Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310
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e-mail: keith.s.forman@navy.mil

Section 3. Responsiveness Summary

The responsiveness summary is the third component of a ROD; its purpose is to summarize information about the views of the public and regulatory agencies on both the remedial alternatives and general concerns about Parcel E-2 submitted during the public comment period. It documents in the record how public comments were integrated into the decision-making process. The participants in the public meeting, held on September 20, 2011, included community members and representatives of the Navy, EPA, DTSC, and the Water Board. Questions and concerns received during the meeting were addressed at the meeting and are documented in the meeting transcript. Responses to comments provided at the meeting and received during the public comment period by the Navy, EPA, DTSC, or the Water Board are included in the responsiveness summary ([Attachment 3](#)). In addition, responses to comments received on the draft and draft final versions of this ROD are provided in [Attachment 4](#).

Attachment 3. Responsiveness Summary

INTRODUCTION

The responsiveness summary provides the views of the public and regulatory agencies as expressed during the public comment period on the Proposed Plan, and documents how public comments were integrated into the decision-making process. Because of the large number of comments received on the Proposed Plan, this introduction summarizes the most commonly expressed views and the Navy's associated responses. This introduction is intended to facilitate a better understanding of how public comments were integrated into the decision-making process, but is not intended to replace the complete responses to each comment received on the Proposed Plan. The complete responsiveness summary immediately follows this introduction.

Issue 1 – Does the Navy know enough about the Parcel E-2 Landfill to select a remedy?

Yes. The Navy has worked closely with the EPA¹, DTSC, Water Board, CCSF DPH, and other project stakeholders for more than 20 years to obtain and evaluate data from the Parcel E-2 Landfill. Section 3 of the RI/FS Report ([ERRG and Shaw, 2011](#)) details the previous environmental investigations performed in and around the Parcel E-2 Landfill. During these investigations, the Navy installed 28 soil borings and 18 monitoring wells and excavated 25 test pits within the Parcel E-2 Landfill (from which over 300 soil and over 240 groundwater samples were analyzed) to evaluate the nature and extent of contamination. As demonstrated by the approval of the Final RI/FS by the EPA, DTSC, and Water Board, the investigations at Parcel E-2 have satisfied the regulatory stakeholders and have provided adequate data to support an informed risk management decision.

When the Navy began preparing the RI/FS Report in 2004, the first step involved evaluating existing site data and reviewing pertinent EPA guidance to develop a preliminary list of remedial alternatives for Parcel E-2. Based on the review, the Navy determined that (1) conditions at the Parcel E-2 Landfill support use of the presumptive containment remedy, and (2) conditions at the Panhandle Area, East Adjacent Area, and Shoreline Area do not support use of the presumptive containment remedy but, consistent with the streamlined approach outlined in the NCP preamble (55 Federal Register 8704-8705, March 8, 1990) and in EPA RI/FS guidance ([EPA, 1988](#)), support evaluation of remedial alternatives focused on containment and excavation. The Navy consulted with the EPA, DTSC, Water Board, and CCSF DPH during this initial stage and, based on their input and input from the community, determined that complete removal of the Parcel E-2 Landfill should also be evaluated as one of the remedial alternatives. This approach is consistent with EPA's directive regarding presumptive remedies ([EPA, 1993b](#)), which states that "*there may be unusual circumstances (such as, complex contaminant mixtures, soil conditions, or extraordinary State and community concerns) that may require the site manager to look beyond the presumptive remedies for additional (perhaps more innovative) technologies or remedial approaches.*" The information contained in the RI/FS Report demonstrates that Parcel E-2 is characterized adequately to support an evaluation of the focused set of remedial alternatives developed in

¹ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

consultation with the EPA, DTSC, Water Board, and CCSF DPH. In addition, the information contained in the RI/FS Report supports the use of the presumptive containment remedy for the Parcel E-2 Landfill and explains the relative risks of that option compared to complete excavation.

Issue 2 – Why was Alternative 5 selected instead of Alternative 2?

The Navy acknowledges the input from many community members expressing their support for Alternative 2 instead of Alternative 5. The Navy is obligated to consider the community's input regarding the cleanup decision for Parcel E-2 because community acceptance is one of nine CERCLA remedy selection criteria identified in the federal regulation called the NCP. As described on page 15 of the Proposed Plan, Criteria 1 and 2 (protection of human health and the environment and compliance with ARARs) are threshold criteria that each alternative must meet to be eligible for selection. Criteria 3, 4, 5, 6, and 7 are balancing criteria used to weigh major tradeoffs in the benefits and limitations among alternatives. Criteria 8 and 9 (state acceptance and community acceptance) are modifying criteria considered in the ROD.

The Navy's evaluation of the remedial alternatives is summarized on pages 15, 16, and 17 of the Proposed Plan. Additional information is included in Sections 2.8 and 2.9 of this ROD. In summary, the preferred alternative published in the Proposed Plan (Alternative 5) complies with the two threshold criteria, and provides the best balance of tradeoffs with respect to the five balancing criteria. The Navy's evaluation of the two modifying criteria did not warrant changes to the preferred alternative. The State of California, through DTSC and the Water Board, and segments of the community, represented by the SFRA and Mayor's Hunters Point Shipyard Citizens Advisory Committee, as well as a number of engaged residents who live in close proximity to HPNS, have agreed with the preferred alternative published in the Proposed Plan. In addition, the preferred alternative is generally consistent with Proposition P as explained on the following pages (under Issue 4). The information presented by members of the community that disagree with the preferred alternative does not justify modification of the preferred alternative based upon the "community acceptance" criteria of the NCP. The preferred alternative will remove significant amounts of contaminants and safely contain the remaining material, and will prevent unacceptable exposure to humans (both future site users and the surrounding community) and wildlife.

Issue 3 – How are Environmental Justice principles considered in the remedy selection process?

The Navy and EPA are firmly committed to achieving the goals identified in the Executive Order on Environmental Justice (E.O. 12898) at HPNS. Both agencies are dedicated to consistent, fair treatment and meaningful participation in environmental decision-making for minority, low-income, and indigenous populations that are disproportionately impacted by pollution. The Navy and EPA, in performing environmental cleanup work at HPNS with support from DTSC and the Water Board, have worked together to achieve the environmental justice goals of fully protective cleanup actions, fair and equal

treatment, and meaningful involvement for all people in the Bayview-Hunters Point community. Our efforts to satisfy these goals include:

- Substantial regulatory review and oversight of all Navy cleanup activities. The EPA, DTSC, Water Board, CCSF, California Department of Public Health, Bay Area Air Quality Management District, and San Francisco Bay Conservation and Development Commission all have dedicated significant additional staff to HPNS to ensure that the Navy's cleanup work is performed in a way that is protective of the Bayview-Hunters Point community and complies with federal and state laws and regulations.
- Substantial financial commitment from the Navy to HPNS cleanup. The Navy has spent approximately \$716M over the past 20 years on the HPNS cleanup program, and these expenditures have made HPNS one of the nation's largest BRAC cleanup programs. The Navy's cleanup efforts to date have successfully removed, treated, or contained a significant volume of contamination that would otherwise pose an unacceptable risk to site workers and future occupants.
- EPA's Technical Assistance Grants to the Community.
 - Technical Assistance Grants (TAG). Since 1993, EPA has consistently provided various community groups with grant money to hire an independent technical advisor to review and provide independent input on the Navy's plans and reports, and to help further explain the Navy's cleanup work to interested community members.
 - Technical Assistance Services for Communities (TASC). EPA used its TASC contract program to provide the community with an independent asbestos technical expert to review the "Draft 2010 U.S. EPA's Review of Dust/Asbestos Control Measures and Air Monitoring at Hunters Point Shipyard Parcel A Report" and other supporting documentation. A community meeting was held where the independent technical advisor presented his findings. In addition, TASC services were used by the community to review the San Francisco Redevelopment Agency's Environmental Impact Report (EIR) for HPNS related to land use and site cleanup. The technical advisor presented formal comments to the CCSF and held a meeting to present independent findings to the broader community.
 - Region 9 Environmental Justice Grant for HPNS. Prior to the national program, the Region 9 EPA Superfund Program developed and awarded a "one-time" HPNS Environmental Justice Small Grant to encourage new activity or improve the quality of existing activities related to environmental justice and cleanup of the HPNS.
- Meaningful Community Engagement under the Navy's Updated Community Involvement Plan (CIP). The Navy updated their CIP in 2011 to present the communication and community involvement program activities that were designed to meet the specific needs and desires of the HPNS community ([Navy, 2011a](#)). The Navy conducts the following specific community outreach efforts in accordance with the CIP: (1) publishing an annual calendar of outreach events; (2) dedicating a Navy team member to serve as Community Involvement Manager; (3) publishing fact sheets on important technical topics; (4) holding regularly scheduled community meetings; (5) publishing an annual overview of the HPNS cleanup program; (6) regularly updating a hardcopy mail and e-mail distribution list to maximize communication; (7) holding periodic bus tours of HPNS to describe the cleanup program; (8) participating in local radio programs to answer questions from the local community; (9) presenting technical

information to a variety of existing community groups; (10) making translation services available to interested community members; and (11) publishing notices in local newspapers to announce public meetings associated with important document reviews.

- Employment. The Navy works closely with their existing contractors to emphasize the importance of hiring community members to assist in the cleanup program, and works with interested stakeholders (such as the CCSF) to promote job training programs. These efforts have proven successful based on recent estimates—from 2009 to 2011 over 1,000 community members have been employed under Navy contracts (on either full-time, part-time, or temporary basis) to assist in the cleanup program. In addition, the Navy and their contractors have identified a large network of local businesses to assist in the cleanup program, such as those providing document production services, supplying building materials and consumables (drinking water and ice), renting heavy equipment, and transporting soil and rock. These efforts have proven successful based on recent estimates of over \$11 million worth of goods and services from local businesses.
- Commitment to Protective Cleanup Actions. Most importantly, the Navy, EPA, and the State of California regulatory agencies are committed to fully protective cleanup actions at Parcel E-2 and throughout HPNS. As described in previous responses, the selected remedy for Parcel E-2 will remove significant amounts of contaminants and safely contain the remaining material, and will prevent unacceptable exposure to humans (both future site users and the surrounding community) and wildlife. Since 2005, the Navy has undertaken a great deal of early action to remove contaminated soil at Parcel E-2, involving the excavation and off-site disposal of over 90,000 cubic yards (over 6,400 truckloads). For the Parcel E-2 landfill itself, the Navy, EPA, and State of California jointly believe that safely isolating and capping the Parcel E-2 Landfill (as specified in Alternative 5) presents less overall risk to the adjacent community when compared with the risks of other cleanup alternatives evaluated, including complete removal of the Parcel E-2 Landfill (in Alternative 2). The combination of removal and containment proposed under Alternative 5 reduces risk sooner, is easier to implement, and is much more cost-effective as compared with Alternative 2. In addition, Alternative 5 provides additional risk reduction as compared with Alternatives 3 and 4.

Issue 4 – How is Alternative 5 consistent with City and County of San Francisco Proposition P?

Proposition P was adopted by the CCSF Board of Supervisors in Resolution 634-01 in August of 2001. Although Proposition P does express a recommendation from the Hunters Point Bayview community for cleanup to a level allowing unrestricted use of the property, Proposition P also urges the Navy to clean up the shipyard in a manner that does not rely on future owners to maintain barriers to protect the public from exposure unless other remedies are technically infeasible. The Navy, in its RI/FS Report that was concurred upon by the other Federal Facility Agreement signatories, has determined that Alternative 2 (which involves excavation and off-site disposal of the entire Parcel E-2 Landfill) poses many complex engineering challenges and borders on being technically infeasible. In addition, Alternative 2 is not cost-effective pursuant to the CERCLA and NCP remedy selection criteria addressed in the Proposed Plan and ROD. The containment remedy selected in the ROD includes a surface cover and a below-ground barrier that will protect the public from exposure to contaminated soil and groundwater.

Proposition P was later addressed in the “*Conveyance Agreement Between the United States of America Acting by and Through the Secretary of the Navy United States Department of the Navy and the San Francisco Redevelopment Agency for the Conveyance of Hunters Point Naval Shipyard*” executed on March 31, 2004. Recital paragraphs 10 and 11 of the Conveyance Agreement referenced Proposition P and reiterated community support for cleanup to the highest level practical. Furthermore, Article 1(q)(iv) of the Conveyance Agreement specifically addresses Parcel E (which at the time of execution also included Parcel E-2) and states in relevant part: “*In any event, the remedies selected for Parcels E and F shall meet applicable Federal and State regulatory requirements, including the nine criteria set forth in 40 CFR 300.430(e)(9)(iii), one of which is community acceptance.*” Recital 10 also acknowledges that the Navy is required under CERCLA to take community acceptance into account in its cleanup decision. The Navy has done so in this ROD and responsiveness summary in accordance with CERCLA and the NCP and has also addressed technical feasibility and cost effectiveness in the ROD in a manner that is consistent with CERCLA, the NCP, Proposition P, the Conveyance Agreement, and the Hunters Point Shipyard Redevelopment Plan.

The Navy’s environmental cleanup program at HPNS addresses the planned reuse outlined in the SFRA’s amended Hunters Point Shipyard Redevelopment Plan ([SFRA, 2010](#)), which was approved 9 years after the adoption of Proposition P and 6 years after execution of the Conveyance Agreement. The Redevelopment Plan was initially approved in 1997 and adopted as the official Redevelopment Plan for HPNS by the CCSF Board of Supervisors (Ordinance 285-97 pursuant to Chapter 4.5 of California Community Redevelopment Law, California Health and Safety Code § 33492). The Redevelopment Plan was subsequently amended in 2010, and the selected remedy would accommodate the future reuses identified in the amended plan.

The Navy also notes that Proposition P is a local governmental resolution and is not a federal or state statute or promulgated regulation. Therefore, Proposition P is not a CERCLA federal or state ARAR for purposes of CERCLA remedy selection in Parcel E-2.

Issue 5 – How will the Navy involve the community during the design of the selected remedy?

Once the ROD for Parcel E-2 is finalized, the Navy will work closely with federal and state regulatory agencies, representatives from the CCSF, and members of the local community to develop a remedial design document. This document will identify the actions necessary to (1) properly implement the selected remedy for Parcel E-2, and (2) perform maintenance and monitoring of the remedy as long as necessary to protect people and wildlife and comply with the pertinent federal and state requirements (as identified in Attachment 4 of this ROD). The remedial design document will also include a detailed analysis of several important elements of the selected remedy that are of interest to the community, including:

- Shoreline Protection,
- Landfill Gas Treatment, and
- Liquefaction Potential.

The remedial design document will be submitted for review and approval by EPA, DTSC, and the Water Board. The Navy will also solicit comments from representatives from the CCSF and members of the local community.

Issue 6 – How will the Navy ensure that the selected remedy will protect people and wildlife in the long-term?

The selected remedy includes the following monitoring and maintenance activities that would be performed as long as necessary to protect human health and the environment and to comply with pertinent federal and state requirements (as identified in Attachment 4 of this ROD):

- Groundwater monitoring will be performed, consistent with the pertinent federal and state requirements, to verify that chemical concentrations in groundwater do not exceed concentrations designated by the RAOs at the compliance boundary.
- Landfill gas monitoring will be performed to demonstrate compliance with the pertinent state requirements.
- Stormwater and erosion controls will be installed and maintained, and stormwater discharges will be monitored as required under the pertinent federal and state requirements.
- The cover will be inspected and maintained to ensure its integrity as required under the pertinent state requirements.

The long-term monitoring and maintenance program will be detailed in the post-closure operation and maintenance plan for Parcel E-2, and submitted for review and approval by EPA, DTSC and the Water Board in conjunction with the remedial design. Regulatory oversight will continue during long-term operation and maintenance of the selected remedy. In addition, the selected remedy will be subject to statutory reviews every 5 years (pursuant to CERCLA) to ensure that it remains protective of human health and the environment.

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Arc Ecology (Saul Bloom) at the public meeting held on September 20, 2011

Comment No.	Comment	Response
1.	<p>(Reading from page 7 of Proposed Plan): “The fire started on August 16th, 2000, and was extinguished at the surface within six hours, but small areas continued to smolder below ground for approximately one month. Because the protective liner and soil cover limits the air from entering into the landfill, the effect was a smothering of any smoldering . . . below the ground.”</p> <p>The problem is -- is that the timing is not exactly correct. I have here the E-mail correspondence for Chein Kao from the Department of Toxic Substances Control. In that period of time, as you know, Chein Kao worked for Arc Ecology.</p> <p>It shows that on -- as of September 11th, almost a month later, the Navy was first introducing the landfill expert to the public at this point. I know this isn’t your problem because you weren’t here at the time, so no reflection on you, but that just simply did not occur at that time.</p> <p>If you jump ahead to September 12th, you have a letter from Dan Meer from the U.S. EPA, Mr. Chestnut’s -- Chesnut’s predecessor; and he is talking about three weeks problem getting the Navy to respond to the landfill fire.</p> <p>If you jump ahead to the 15th, you find the letter that the Navy is preparing an emergency removal action plan for the proposed cap at the time.</p> <p>And so the timing simply doesn’t work. You need to get that right.</p> <p>And we all know that ATSDR began a program on -- in November that was finalized in December. And at that point, the land -- the air documentation came, and the Navy proposed in February that stopped sampling there; and in March it was announced. So thank you. That it was closed.</p> <p>So I think the record needs to be adjusted to reflect that time line. It’s easy to have it.</p> <p>And the problem that I have with seeing an error like that is that it worries me about the rest of the analysis because it’s a very, very simple thing to check. [Refer to the transcript of the public meeting on pages 97 through 100 for the complete comment.]</p>	<p>The subject statement in the Proposed Plan correctly states that the surface fire was extinguished in 6 hours, but subsurface smoldering continued for approximately 1 month. This information was published previously in fact sheets prepared by the Navy (Navy, 2000a, 2000b, and 2000c) and a health consultation performed by the ATSDR² (2001). Information relating to the fire and associated response actions is provided in the document titled “Removal Action Landfill Cap Closeout Report.” This document, which was finalized in February 2005 after review and comment by the EPA, DTSC, and Water Board, was provided as Appendix E to the RI/FS Report for Parcel E-2 (ERRG and Shaw, 2011). Based on this information, the Navy believes that the administrative record accurately reflects the timeline of activities regarding the landfill fire and associated response actions, and that no correction is required.</p>

² Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Arc Ecology (Saul Bloom) at the public meeting held on September 20, 2011 (continued)

Comment No.	Comment	Response
2.	<p>Now, in Proposition P -- and I know because I wrote it -- was focused on the community acceptance criteria of the National Contingency Plan. There's no opt-out in the -- in the NCP with regard to agreeing or not agreeing. The Navy's required to look at this modifying criteria. It may not necessarily abide by it, but it is required to look at it and consider it duly.</p> <p>But it's also based on BRAC policy, required to look at reuse authority. The reuse authority is a -- powered by the Board of Supervisors of San Francisco. And in August 2001, the Board of Supervisors adopted the Proposition P as city policy. Proposition P was also incorporated in 2004 as a conveyance agreement that the Navy signed with the City of San Francisco. And I should also mention that the 1992 Federal Facilities Compliance Act also followed the BRAC legislation, and so that further informed BRAC legislation, which again requires the Navy to follow all federal regulations.</p> <p>Reuse plan for the shipyard is silent on the matter of whether or not the use has any effect on Proposition P, in fact. One could go ahead and remediate that site fully to Proposition P levels, and there's nothing to say that that will not be fully compliant with the use.</p> <p>And there are long-term interests that people have within that site. In fact, the failure to provide Prop P guidance does in fact dictate what the City's options are with regard to future uses of that site. We can't do certain little things, wetlands and other activities on that site. They are required for excavation because it would violate the institutional controls and land-use controls and instruments the Navy plans to have in place at that site.</p> <p>So Proposition P is an important thing for the Navy to take into consideration and to give its due weight too. [Refer to the transcript of the public meeting on pages 106 through 108 for the complete comment.]</p>	<p>As described on page 16 of the Proposed Plan, the community acceptance criterion is one of two modifying criteria and has been evaluated based on comments provided in the course of the CERCLA remedy selection process, including those received on the Proposed Plan, and other community input, including Proposition P. Consistent with the NCP [40 CFR § 300.430(e) and (f)], the Navy's evaluation of the community acceptance criterion is documented in this ROD, which includes the subject responsiveness summary. The Navy notes that the SFRA and the Mayor's Hunters Point Shipyard Citizens Advisory Committee, as well as a number of engaged residents who live in close proximity to HPNS, have agreed with the preferred alternative published in the Proposed Plan and their agreement documents community acceptance.</p> <p>Proposition P was adopted by the CCSF Board of Supervisors in Resolution 634-01 in August of 2001. Although Proposition P does express a recommendation from the Hunters Point Bayview community for cleanup to a level allowing unrestricted use of the property, Proposition P also urges the Navy to clean up the shipyard in a manner that does not rely on future owners to maintain barriers to protect the public from exposure <u>unless other remedies are technically infeasible</u>. The Navy, in its RI/FS Report that was concurred upon by the other Federal Facility Agreement signatories, has determined that Alternative 2 (which involves excavation and off-site disposal of the entire Parcel E-2 Landfill) poses many complex engineering challenges and borders on being technically infeasible. In addition, Alternative 2 is not cost-effective pursuant to the CERCLA and NCP remedy selection criteria addressed in the Proposed Plan and ROD. The containment remedy selected in the ROD includes a surface cover and a below-ground barrier that will protect the public from exposure to contaminated soil and groundwater.</p>

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Arc Ecology (Saul Bloom) at the public meeting held on September 20, 2011 (continued)

Comment No.	Comment	Response
2. (cont.)	(<i>see above</i>)	<p>Proposition P was later addressed in the “<i>Conveyance Agreement Between the United States of America Acting by and Through the Secretary of the Navy United States Department of the Navy and the San Francisco Redevelopment Agency for the Conveyance of Hunters Point Naval Shipyard</i>” executed on March 31, 2004. Recital paragraphs 10 and 11 of the Conveyance Agreement referenced Proposition P and reiterated community support for cleanup to the highest level <u>practical</u>. Furthermore, Article 1(q)(iv) of the Conveyance Agreement specifically addresses Parcel E (which at the time of execution also included Parcel E-2) and states in relevant part: “<i>In any event, the remedies selected for Parcels E and F shall meet applicable Federal and State regulatory requirements, including the nine criteria set forth in 40 CFR 300.430(e)(9)(iii), one of which is community acceptance.</i>” Recital 10 also acknowledges that the Navy is required under CERCLA to take community acceptance into account in its cleanup decision. The Navy has done so in this ROD and responsiveness summary in accordance with CERCLA and the NCP and has also addressed technical feasibility and cost-effectiveness in the ROD in a manner that is consistent with CERCLA, the NCP, Proposition P, the Conveyance Agreement, and the Hunters Point Shipyard Redevelopment Plan.</p> <p>The Navy’s environmental cleanup program at HPNS addresses the planned reuse outlined in the SFRA’s amended Hunters Point Shipyard Redevelopment Plan (SFRA, 2010), which was approved 9 years after the adoption of Proposition P and 6 years after execution of the Conveyance Agreement. The Redevelopment Plan was initially approved in 1997 and adopted as the official Redevelopment Plan for HPNS by the CCSF Board of Supervisors (Ordinance 285-97 pursuant to Chapter 4.5 of California Community Redevelopment Law, California Health and Safety Code § 33492). The Redevelopment Plan was subsequently amended in 2010, and the selected remedy would accommodate the future reuses identified in the amended plan.</p> <p>The Navy also notes that Proposition P is a local governmental resolution and is not a federal or state statute or promulgated regulation. Therefore, Proposition P is not a CERCLA federal or state ARAR for purposes of CERCLA remedy selection in Parcel E-2.</p>

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Reverend Arnold Townsend at the public meeting held on September 20, 2011

Comment No.	Comment	Response
1.	<p>I'm associate pastor at Without Walls Church, which happens to be located at 860 Innes Street, which is right down the block from the shipyards. So quite naturally, we have concerns, had concerns before we moved there. The concerns have only been -- have only increased since moving.</p> <p>I support the project, support the concept of the project, certainly. But I think it's simple to say that no one in their right mind, I hope, wants a project that is not clean and absolutely cleaned; and it is absolutely essential that you do it for the people of Hunters Point who have suffered and who have sat here all these years with the site that's basically not safe right now, a site that's basically not really clean right now. And folks are not quite sure how bad it is.</p> <p>So we certainly need something to be done. The reality is we would just like to see it done right and want to make sure that there's some confidence given to the people that it is being done right.</p> <p>So reality, once again, is that you need to make sure you go out of your way to assuage the fears and concerns of the people in the community and -- because the things that may seem clean to -- may seem clear to those of you who work in the process are not always as clear to lay people. So you need to take the time to work and spend the money to make sure that all the questions are answered and answered publicly. [Refer to the transcript of the public meeting on pages 100 and 101 for the complete comment.]</p>	<p>The Navy understands the desire of community members to have HPNS³ cleaned up to the highest standards. The Navy also recognizes its responsibility to properly communicate the potential risks at Parcel E-2 to community members, and to answer all questions posed regarding the Navy's preferred alternative published in the Proposed Plan. This responsiveness summary is an important tool that the Navy uses to meet these obligations. The Navy understands the challenges of reaching out to the community and directly answering their questions; we continue to work on improving our CIP to help more people understand recommended cleanup actions at HPNS. The following paragraphs provide the Navy's responses to questions about the potential risks at and the degree of cleanup for Parcel E-2.</p> <p>The potential risks at Parcel E-2 are summarized in pages 9 and 10 of the Navy's Proposed Plan. Additional information is included in Section 2.5 of this ROD. In summary, the Navy estimated potential risk from exposure to contamination (based on current conditions if no action was taken) and determined that there were unacceptable risks that required remedial (cleanup) action. The Navy determined that Remedial Alternatives 2 through 5, once properly implemented, would each protect humans and wildlife from these potential risks. The EPA, DTSC, Water Board, and CCSF DPH have reviewed and have agreed with the Navy's findings. The Navy will continue to make its staff available to participate in various community outreach activities, and will answer questions regarding the cleanup process at HPNS (including Parcel E-2). The next community meeting is scheduled for April 2012, at which the draft ROD for Parcel E-2 will be discussed. Navy staff will be available at this meeting to answer questions about the proposed cleanup activities at Parcel E-2.</p>

³ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Reverend Arnold Townsend at the public meeting held on September 20, 2011 (continued)

Comment No.	Comment	Response
1.	(see above)	<p>The Navy is obligated to consider the community's input regarding the cleanup decision for Parcel E-2 because community acceptance is one of nine CERCLA remedy selection criteria identified in the federal regulation called the NCP. As described on page 15 of the Proposed Plan, Criteria 1 and 2 (protection of human health and the environment, and compliance with ARARs) are threshold criteria that each alternative must meet to be eligible for selection. Criteria 3, 4, 5, 6, and 7 are balancing criteria used to weigh major tradeoffs in the benefits and limitations among alternatives. Criteria 8 and 9 (state acceptance and community acceptance) are modifying criteria considered in the ROD.</p>

The Navy's evaluation of the remedial alternatives is summarized on pages 15, 16, and 17 of the Proposed Plan. Additional information is included in Sections 2.8 and 2.9 of this ROD. In summary, the preferred alternative published in the Proposed Plan (Alternative 5) complies with the two threshold criteria, and provides the best balance of tradeoffs with respect to the five balancing criteria. The Navy's evaluation of the two modifying criteria did not warrant changes to the preferred alternative. The State of California, through DTSC and the Water Board, and segments of the community, represented by the SFRA and Mayor's Hunters Point Shipyard Citizens Advisory Committee, as well as a number of engaged residents who live in close proximity to HPNS, have agreed with the preferred alternative published in the Proposed Plan. In addition, the preferred alternative is generally consistent with Proposition P, as explained in the responses to comments from Arc Ecology (see pages 8 and 9 of this responsiveness summary). The information presented by members of the community that disagree with the preferred alternative does not justify modification of the preferred alternative based upon the "community acceptance" criteria of the NCP. The preferred alternative will remove significant amounts of contaminants and safely contain the remaining material, and will prevent unacceptable exposure to humans (both future site users and the surrounding community) and wildlife.

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Espanola Jackson at the public meeting held on September 20, 2011

Comment No.	Comment	Response
1.	<p>What I've seen going on over and over again is that the little millions of dollars that Congress gives that clean the shipyard has been nothing.</p> <p>...I feel that you, Navy, along with the City, along with the EPA and everybody else, should send to our representatives, which is Dianne Feinstein, Pelosi, and Boxer -- I called those names before -- that \$10 billion one time be set aside to clean up that Superfund site because there's no way that -- there is no way them few little million dollars just goes straight to the surface.</p> <p>Maybe won't take \$10 billion to clean the shipyard. Maybe it just takes 6 billion. But let's do something instead of just coming back, because you been here too long. [Refer to the transcript of the public meeting on pages 102 through 104 for the complete comment.]</p>	<p>The Navy has spent approximately \$716M over the past 20 years on the HPNS⁴ cleanup program, and these expenditures have made HPNS one of the nation's largest BRAC cleanup programs. The Navy's cleanup efforts to date have successfully removed, treated, or contained a significant volume of contamination that would otherwise pose an unacceptable risk to site workers and future occupants. The cleanups are consistent with the SFRA's Redevelopment Plan (SFRA, 2010). In addition, the Navy has worked closely with the EPA, DTSC, Water Board, and CCSF to investigate and study all of the contaminated sites at HPNS and make sure that these efforts are performed and documented to comply with federal and state regulations. The Navy will continue to work with the EPA, DTSC, Water Board, and CCSF, the community, and the congressional representatives from San Francisco to move forward with the cleanup program as quickly and efficiently as possible.</p>

⁴ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Jeffrey Butron at the public meeting held on September 20, 2011

Comment No.	Comment	Response
1.	<p>I'm a Costanoan Rumsen Ohlone. I come to represent my people today. But also, what my tribe is requesting, we're not taking -- asking for consideration. We're requesting. Since this was once occupied by our ancestors and, of course, there's a lot of shell still out there and there's probably some villages and there's also a lot of digging that's being dug up. What we're requesting is -- we're not asking for land, but we are asking for an easement.</p> <p>An easement is basically to where our tribe and other Ohlone tribes and other California tribes and even other cultures of the other ethnic cultures can come and utilize this area -- and so that they could actually have a ceremony and some kind of spiritual, you know, gathering together. [Refer to the transcript of the public meeting on pages 104 through 106 for the complete comment.]</p>	<p>The Navy understands its obligation, as required by the National Historic Preservation Act, to consider and properly address potential impacts upon cultural resources at HPNS⁵, including shellmounds from native people who used the land prior to the Navy's occupancy. To meet this obligation, the Navy, in consultation with the Advisory Council on Historic Preservation and State Historic Preservation Office, identified potential archaeological resources at HPNS and established a process by which all proposed underground construction must be reviewed to make sure that potential archaeological resources are not adversely affected. The Navy identified a potential buried shellmound in the northwest portion of Parcel E-2, but determined that the proposed remedial alternatives would not adversely affect this potential resource because the underground construction is limited to excavation of artificial fill and solid waste placed by the Navy and placement of clean imported soil. Further information is included in Appendix N (Section N3.4.1) of the RI/FS Report (ERRG and Shaw, 2011).</p> <p>Regarding the request for an easement, the Navy wishes to clarify that SFRA has identified the planned redevelopment and future use of HPNS in coordination with the Navy's cleanup program. As discussed in the Proposed Plan, Parcel E-2 is planned for open space use. The SFRA's Redevelopment Plan for HPNS states that the planned open space in Parcel E-2 may include recreational areas and plazas that will be open to the public (SFRA, 2010).</p>

⁵ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Spoken Comments by Ell Jennison at the public meeting held on September 20, 2011

Comment No.	Comment	Response
1.	<p>I kind of brought it up in my question, but I think that there should be a total cleanup before the land is turned over to the City for redevelopment.</p> <p>And I -- and I think that we should realize that we're all in this together as far as not just the community but the whole nation. This is part of -- This -- this and the -- and the toxicity that was generated there in Hunters Point was to protect this country.</p> <p>And so then I think it's important to realize that you are our Navy and that I think that you should stipulate to our city government that this is completely cleaned up before it is -- any type of development is allowed in that area. [Refer to the transcript of the public meeting on pages 108 and 109 for the complete comment.]</p>	<p>The Navy understands the desire of community members to have HPNS⁶ cleaned up to the highest standards. The Navy is obligated to consider the community's input regarding the cleanup decision for Parcel E-2 because community acceptance is one of nine CERCLA remedy selection criteria identified in the federal regulation called the NCP. As described on page 15 of the Proposed Plan, Criteria 1 and 2 (protection of human health and the environment, and compliance with ARARs) are threshold criteria that each alternative must meet to be eligible for selection. Criteria 3, 4, 5, 6, and 7 are balancing criteria used to weigh major tradeoffs in the benefits and limitations among alternatives. Criteria 8 and 9 (state acceptance and community acceptance) are modifying criteria considered in the ROD.</p> <p>The Navy's evaluation of the remedial alternatives is summarized on pages 15, 16, and 17 of the Proposed Plan. Additional information is included in Sections 2.8 and 2.9 of this ROD. In summary, the preferred alternative published in the Proposed Plan (Alternative 5) complies with the two threshold criteria, and provides the best balance of tradeoffs with respect to the five balancing criteria. The Navy's evaluation of the two modifying criteria did not warrant changes to the preferred alternative. The State of California, through DTSC and the Water Board, and segments of the community, represented by the SFRA and Mayor's Hunters Point Shipyard Citizens Advisory Committee, as well as a number of engaged residents who live in close proximity to HPNS, have agreed with the preferred alternative published in the Proposed Plan. In addition, the preferred alternative is generally consistent with Proposition P as explained in the responses to comments from Arc Ecology (see pages 8 and 9 of this responsiveness summary). The information presented by members of the community that disagree with the preferred alternative does not justify modification of the preferred alternative based upon the "community acceptance" criteria of the NCP. The preferred alternative will remove significant amounts of contaminants and safely contain the remaining material, and will prevent unacceptable exposure to humans (both future site users and the surrounding community) and wildlife.</p>

⁶ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Written Comments by Sudeep Rao received at the public meeting held on September 20, 2011

Comment No.	Comment	Response
1.	We need to assess the feasibility and risk including short-term implementability of using barges to transport the wastes from Parcel E-2.	<p>The Navy's RI/FS⁷ Report considered a range of options to transport wastes from Parcel E-2, but the analysis focused mostly on a combination of truck and rail transport (ERRG and Shaw, 2011). Transport by barge was not evaluated in detail because of several factors, most notably:</p> <ul style="list-style-type: none"> • Suitable dock facilities are not available near Parcel E-2, and the lack of nearby dock facilities would require picking up and moving the waste multiple times before loading onto a barge. This handling process would be significantly less efficient and more expensive as compared to truck and rail transport. • Relatively few licensed disposal facilities located in the western U.S. accept the range of wastes types that would be generated during cleanup at HPNS. None of these facilities are located close to waterways that allow for barge transport. As a result, the material to be transported by barge would also need to be picked up and transported significant distances by either truck or rail. This handling process would be significantly less efficient and more expensive as compared to truck and rail transport.
2.	I don't see how this is a plan for <u>closure</u> of a landfill when it is just a sequestered landfill. Radium dials, etc. are left behind.	<p>"Closure" is broad term used in federal and state regulations regarding actions performed at inactive landfill sites to prevent exposure to buried solid waste. The most common closure action for large landfills (like that at Parcel E-2) is to contain and manage the waste in place, although complete removal is performed sometimes for small landfills. Based on the evaluation presented in the RI/FS Report and summarized in the Proposed Plan, the selected remedy for Parcel E-2 involves containment and professional management (including ongoing monitoring and maintenance in accordance with federal and state ARARs) of the Parcel E-2 Landfill.</p>

⁷ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Written Comments by Sudeep Rao received at the public meeting held on September 20, 2011 (continued)

Comment No.	Comment	Response
3.	Landfill cannot be hermetically sealed. So why not use permeable barriers that filter toxic materials but not water?	The Navy evaluated the potential contaminant migration pathways from the landfill waste to surrounding groundwater and San Francisco Bay. The site data indicate that the primary area of potential concern is along the Parcel E-2 shoreline, at the PCB Hot Spot Area and the adjoining portions of the Parcel E-2 Landfill located close to San Francisco Bay. The Navy evaluated the potential use of permeable reactive barriers to treat groundwater near the Parcel E-2 shoreline and determined that it was not a viable technology because of issues with its effectiveness, implementability, and cost in addressing the site-specific conditions at Parcel E-2. Additional information is provided in Section 11.5.5.5 of the RI/FS Report (ERRG and Shaw, 2011).
4.	If we leave a landfill in place, we need real-time monitoring. Can this be made a reality?	Certain types of contaminants (for example, methane in landfill gas) can be monitored in real-time using field instruments. However, other chemicals in landfill gas and groundwater require collection and analysis of samples at a licensed laboratory to obtain data that meets federal and state requirements for quality and accuracy. Accordingly, with the exception of some landfill gas monitoring, real-time monitoring is not currently a viable option for long-term monitoring at Parcel E-2. The Navy will evaluate the best available technologies when developing the long-term monitoring plan for Parcel E-2 (after the ROD is finalized and in conjunction with the remedial design). In addition, the Navy will reevaluate the monitoring program on a regular basis to ensure that activities are being performed as efficiently as possible. As previously discussed, professional management, including ongoing monitoring and maintenance in accordance with federal and state ARARs, is an essential component of the selected remedy for Parcel E-2.

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Written Comments by San Francisco Department of Public Health (Amy Brownell) received on October 5, 2011 via e-mail

Comment No.	Comment	Response
Introduction	<p>Proposed Plan for Parcel E-2, Hunters Point Shipyard, dated September 2011</p> <p>The San Francisco Redevelopment Agency through the San Francisco Department of Public Health and its consultants, Treadwell and Rollo, have closely monitored the Regulatory Agencies' oversight and the Navy's investigation and cleanup of the Hunters Point Shipyard including Parcel E-2 for the past 18 years. We have reviewed many technical documents written about Parcel E-2 (Attachment A). Based on our review and involvement in this process, it is our opinion that the Navy has adequately studied and understands the nature and extent of the contamination on Parcel E-2 and that the remedial alternatives listed in the Parcel E-2 Proposed Plan are, in our technical judgment, feasible and follow accepted scientific understanding and industry standards for the range of possible remedies for dealing with the contamination at Parcel E-2.</p> <p>We support the process being implemented by the Navy and the Regulatory Agencies to select a preferred alternative that best meets all CERCLA criteria. We strongly encourage that substantial consideration and weight are given in this process to input from the public and all stakeholders.</p> <p>We have a few technical comments on some elements of the Alternatives as follows:</p>	<p>The Navy understands its obligation to consider the community's input regarding the cleanup of Parcel E-2. The Navy's evaluation of the community acceptance criterion is documented in this ROD⁸, which includes the subject responsiveness summary.</p>
1.	<p>Where feasible and practical, we support the removal of contaminants to off-site disposal facilities to facilitate the intended reuse of the property as set forth in the Hunters Point Shipyard Redevelopment Plan, amended August 3, 2010.</p>	<p>The Navy's selected remedy incorporates excavation and off-site disposal in areas that pose substantial risk to humans and wildlife, with remaining contamination being safely contained to facilitate future use of Parcel E-2 in accordance with the Hunters Point Shipyard Redevelopment Plan (SFRA, 2010).</p>

⁸ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Written Comments by San Francisco Department of Public Health (Amy Brownell) received on October 5, 2011 via e-mail (continued)

Comment No.	Comment	Response
2.	<p>We support the use of land use and activity restrictions, as needed, in order to protect the remedies and public health and the environment. We look forward to working with the Navy to design land use and activity restrictions that will allow for full use of the property for the intended use without an undo burden on the local government or other future property owners.</p>	<p>The Navy will work closely with stakeholders from the CCSF to develop a LUC RD for Parcel E-2. The LUC RD will build upon similar documents developed for other HPNS parcels and will identify the actions (including inspections, enforcement, and reporting) necessary to properly implement land use and activity restrictions at Parcel E-2. The LUC RD will also identify the roles and responsibilities of federal, state, and local government in implementing the land use and activity restrictions at Parcel E-2.</p>
3.	<p>For the wetlands design, as long as the sediment contamination issues have been adequately addressed by other elements of the remedy, we encourage the selection of an alternative that allows for construction of unlined wetlands because it will allow for better freshwater interaction with groundwater which might make the wetlands more sustainable in the long run. We look forward to the Navy's further analysis of the design of the wetlands in the Remedial Design process.</p>	<p>The Navy's selected remedy includes restoration of tidal and freshwater wetlands without a liner (to promote a more natural hydrologic function within the wetlands and underlying groundwater). As noted in Section 14.1 of the RI/FS Report (ERRG and Shaw, 2011), additional analysis would be performed during the remedial design to verify that the net inflow of potentially contaminated groundwater into the proposed freshwater wetlands would be negligible.</p>

Proposed Plan for Parcel E-2, Hunters Point Naval Shipyard

Written Comments by Francisco DaCosta received on October 24, 2011 via internet blog posting (<http://www.franciscodacosta.com/articles/bayview168.html>)

Comment No.	Comment	Response
1.	<p>The United States Navy has harmed millions of people all over the world. In recent times using missiles and other dangerous bombs sometimes with justification at other times without. It is no exception at Hunters Point Naval Shipyard - in San Francisco at Bayview Hunters Point.</p> <p>The U.S. Navy took a large area of land over 800 acres by eminent domain as part of its World War II operations and contaminated pristine land. It filled the pristine wetlands and destroyed two hills containing serpentine rock, crushed the rock containing and released Asbestos structures and spread the contaminated material all over Hunters Point Naval Shipyard - as part of the fill in operations and created of the piers and naval operations.</p> <p>The United States Navy known well for its “jettison orders” from around 1850 to late 1970s continued to contaminate the entire Hunters Point Naval Shipyard. When the U.S. Navy shut down its operations in 1974 - it leased the Shipyard to entities like AAA Shipyard Repairs who further contaminated the Hunters Point Naval Shipyard - dumping contaminated wastes of the worst order.</p> <p>Most egregious behavior of the U.S. Navy was the desecration of the Hunters Point Naval Shipyard by spreading the remains of the Ohlone the First People of San Francisco and the immediate area. The U.S. Navy well knows that it cannot run away from its obligation to first apologize and then offer restitution. The U.S. Navy has shunned addressing the archeological survey mandated by Federal Regulation and linked to the First People in this case the Ohlone.</p> <p>Thus as the Spokesperson on all matters linked to Base Closures, Infrastructure and related issues representing the Muwekma Ohlone, the First People of the San Francisco area and having Patrimonial Jurisdiction over Hunters Point Naval Shipyard - I said; and stand by my statement: “No good will ever come at Hunters Point Naval Shipyard.” Aho.</p>	<p>The Navy has spent approximately \$716M over the past 20 years on the HPNS⁹ cleanup program, and these expenditures have made HPNS one of the nation's largest BRAC cleanup programs. The Navy's cleanup efforts to date have successfully removed, treated, or contained a significant volume of contamination that would otherwise pose an unacceptable risk to site workers and future occupants. The cleanups are consistent with the SFRA's Redevelopment Plan (SFRA, 2010). In addition, the Navy has worked closely with the EPA, DTSC, Water Board, and CCSF to investigate and study all of the contaminated sites at HPNS and make sure that these efforts are performed and documented in a way that meets federal and state regulations.</p> <p>The Navy understands its obligation, as required by the National Historic Preservation Act, to consider and properly address potential impacts upon cultural resources at HPNS, including shellmounds from native people who used the land prior to the Navy's occupancy. To meet this obligation, the Navy, in consultation with the Advisory Council on Historic Preservation and State Historic Preservation Office, identified potential archaeological resources at HPNS, and established a process by which all proposed underground construction must be reviewed to make sure that potential archaeological resources are not adversely affected. The Navy identified a potential buried shellmound in the northwest portion of Parcel E-2, but determined that the proposed remedial alternatives would not adversely affect this potential resource because the underground construction is limited to excavation of artificial fill and solid waste placed by the Navy and placement of clean imported soil. Further information is included in Appendix N (Section N3.4.1) of the RI/FS Report (ERRG and Shaw, 2011).</p>

⁹ Acronyms and abbreviations are summarized at [the end of this responsiveness summary](#).